

Abundant Species of Earthworms in Different Regions of India - A Review

Om Prakash

Assistant Professor, Department of Zoology, H. R. P. Degree College, Pilibhit, India

Abstract: Objectives: There are many reports that earthworms are extensively used as fish feed, fish bait, poultry feed or as suitable protein feed in piggeries. Presence of earthworms in the soil systems, increasing the fertility status of the soil. Keeping this in mind, density and diversity of earthworms in different parts of the country was evaluated. Thereby the article provides the knowledge of earthworm species, distributed in different habitats, on various parts of India, to young researchers for further survey research work on this field.

Materials and Methods: Biodiversity of earthworms in some regions of the country viz., Shilong, Central Himalaya, western Himalaya, Pondicherry region, Nandadevi and Nilgiri Biosphere, Gwalior region of Madhya Pradesh, Gangetic plain of Uttar Pradesh, western Uttar Pradesh, arid regions of Rajasthan, etc. already been carried out, time to time by various researchers thereby this article summarized these studies as well.

Results: As per the urgent need of young researchers, the present article describe 123 species of earthworms belonging to 47 genera with 08 families viz., *Naidae*, *Tubificidae*, *Lumbricidae*, *Megascolecidae*, *Octochaetidae*, *Moniligastridae*, *Ocnoderilidae*, and *Acanthodrilidae*. Out of these, some worm's species namely, *Eutyphoeus waltoni*, *Metaphire posthuma*, *Perionyx excavates* and *Lampito mauritii*, were noticed most abundant species of earthworms as these were distributed in all the regions, surveyed by various workers in the country. Due to the deficiency of clear-cut knowledge of earthworm species, it is difficult to provide exact earthworm fauna of the country. Therefore, young researchers should come on these lines for the relevant topic.

Conclusion: However, more than 509 species of earthworms have been reported by various workers till now but most abundant species are few ones. Although, western Himalayan region, Orissa state as well as Uttar Pradesh states, were recorded as mega diversity regions for earthworms.

Keywords: Checklist, Earthworm genera, Earthworm species, Earthworm distribution & India.

1. Introduction

A number of biologists have confined and documented the biodiversity study of earthworms in various parts of the world (40-41, 5-7, 12-14, 8 and 33). According to Reynolds (31), there are 3,627 terrestrial species of earthworms. He discussed global distribution, barriers to migration, habitat requirement and functions of earthworms in the soil system. Out of these global species of earthworms, 509 species belonging to 67 genera and 10 families have been recorded from Indian subcontinent, indicating a high degree of diversity in this region as compared to other areas (20-21). Several efforts have been made to look

into the dominance and diversity of earthworms in different parts of the country (38, 17, 23, 19, 3, 18, 9, 26, 28, 39, 11 and 4). The species of the families- Megascolecidae, Moniligastridae, Octochaetidae, Ocnoderilidae, Almidiae are found distributed in all the agroecosystems, pastures, and natural forests. The intensification of agriculture and other disturbances might result in changes in species composition and abundance (24, 4, 15, and 22).

2. Study Area: Various parts of India

India is the most productive country of the world for agricultural outputs. It is located between latitude 20.5937°N and longitude 78.9629°E, and surrounded by China and Nepal from north; Sri Lanka and Hind Mahasagar from south; Burma and Bangladesh from east and western Pakistan & Afghanistan from the west. The annual average rainfall of the country is 300-650 mm (11.8-25.6 in) and different types of soils viz., alluvial soil (43%), red soil (18.5%), black/regur soil (15%), clay loamy sandy soil, arid/desert soil, laterite soil, saline soil, peaty/marshy soil and forest soil etc. distributed throughout India. From which, alluvial and sandy to clay loamy soil, identified most fertile soil for growing different types of crops viz., *Brassica campestris*, *Brassica nigra*, *Saccharum officinarum*, *Mentha piperita*, *Cicer arietinum*, *Lens esculenta* etc. in the agriculture. Biodiversity of earthworms carried out only in few regions/sites, such as western Uttar Pradesh, Rajasthan, western Himalaya, Pondicherry region, Orissa, Madhya Pradesh, Tripura, Tamilnadu & Madras states. The information available on the earthworm's fauna of the various states of the country i.e. India is very little and incomplete till now. Hence, the present review report emphasizes that the extensive survey of earthworms should be done in the remaining parts or states of India.

3. Results and discussion

Singh (35), has made an extensive survey in the Varansi region of Uttar Pradesh to identify the most common species of earthworms during 1992-1993, and reported eleven species of earthworms viz., *Metaphire posthuma*, *Lampito mauritii*, *Eutyphoeus incommodus*, *E.nicholsoni*, *E.waltoni*, *Octochaetona surensis*, *Ramiella bishambari*, *Drawida calebi*, *Glyphidrilus sp.*, *Dichogaster bolau*, and *Amyntas morrisi*.

Table 1
Checklist of earthworm species of western Himalaya, India (Paliwal & Julka, 2005)

Families	Genera	Earthworm species			
A).Moniligastridae	i.Drawida	1. <i>D.japonica</i> (Mich, 1872) 2. <i>D.nepalensis</i> (Mich, 1907)			
B).Lumbricidae	ii.Allolobophora	3. <i>A.eiseni</i> (Levinsen, 1884) 4. <i>A.parva</i> (Eisen, 1814)			
	iii.Apporrectodea	5. <i>A.caliginosa caliginosa</i> (Sav, 1826) 6. <i>A.caliginosa trapezoids</i> (Duges,1828) 7. <i>A.rosea rosea</i> (Sav,1826)			
	iv.Dendrobaena	8. <i>D.hortensis</i> (Mich, 1890) 9. <i>D.octaetra</i> (Sav, 1826)			
	v.Dendrodrilus	10. <i>D.rubidus</i> (Sav, 1826)			
	vi.Eisenia	11. <i>E.fetida</i> (Sav, 1826)			
	vii.Eiseniella	12. <i>E.tetraetra tetraetra</i> (Sav, 1826)			
	viii.Lumbricus	13. <i>L.castaneus</i> (Sav, 1826) 14. <i>L.terrestris</i> (Linnaeus, 1758)			
	ix.Octolasion	15. <i>O.cyaneum</i> (Sav, 1826) 16. <i>O.tyrtaeum</i> (Sav, 1826)			
	C).Almidae	x.Glyphidrilus	17. <i>Glyphidrilus sps.</i> Gangeticus (Gates, 1958)		
D).Ocnodrilidae	xi.Malabararia	18. <i>M.levis</i> (Chen, 1938)			
	xii.Ocnodrilus	19. <i>O.occidentalis</i> (Eisenia, 1878)			
	xiii.Thatonia	20. <i>T.exilis</i> (Gates, 1945) 21. <i>T.gracilis</i> (Gates,1942)			
E).Acanthodrilidae	Microscolex	22. <i>M.phosphoreus</i> (Duges, 1837)			
	Plutellus	23. <i>P.sadhupulensis</i> (Julka & Paliwal, 1994)			
F).Octochaetidae	Dichogaster	24. <i>D.bolauai</i> (Mich, 1891)			
	Eutyphoeus	25. <i>E.annandalei</i> (Mich, 1907) 26. <i>E.incommodus</i> (Beddard, 1901) 27. <i>E.nainianus</i> (Mich, 1907) 28. <i>E.nicholsoni</i> (Beddard, 1901) 29. <i>E.orientalis</i> (Bedd, 1883) 30. <i>E.pharpiingianus</i> (Mich, 1907) 31. <i>E.waltoni</i> (Mich, 1907)			
		Lennogaster	32. <i>L.chittagongensis</i> (Steph, 1917) 33. <i>L.parpus</i> (Steph, 1920) 34. <i>L.pusillus</i> (Steph, 1920) 35. <i>L.yeicus</i> (Steph, 1931)		
			Octochaetona	36. <i>O.beatrix</i> (Bedd, 1902)	
				Ramiella	37. <i>R.bishambari</i> (Steph, 1914)
				Amynthas	38. <i>A.alexandri</i> (Bedd, 1900) 39. <i>A.corticis</i> (Kinb, 1867) 40. <i>A.gracilis</i> (Kin, 1867) 41. <i>A.morrisi</i> (Bed, 1892)
		Metaphire	42. <i>M.anomala</i> (Mich, 1907) 43. <i>M.birmanica</i> (Rosa, 1888) 44. <i>M.houlleti</i> (Perrier, 1872)		
			Perionyx	45. <i>M.posthuma</i> (Vaillant, 1868) 46. <i>P.bainii</i> (Steph, 1915) 47. <i>P.parotensis</i> (Julka & Paliwal, 1993) 48. <i>P.excavates</i> (Perrier, 1872) 49. <i>P.nainianus</i> (Mich, 1907) 50. <i>P.sansibaricus</i> (Mich, 1891) 51. <i>P.simlaensis</i> (Mich, 1907).	

He concluded that among these, *L.mauritii*, *E.incommodus*, *E.nicholsoni*, *O.surensis* and *D.bolauai* were very common and abundant species in this region. Tripathi and Bhardwaj (39), surveyed out a total nine earthworm species belonging to four different families viz., Glossoscolecidae, Megascolecidae, Ocnodrilidae, and Octochaetidae from different habitats of Jodhpur district, Rajasthan, India and surveyed species were *Pontoscolex corethrurus*, (Glossoscolecidae), *Amynthas morrisi*, *Metaphire posthuma*, *Lampito mauritii*, and *Perionyx sansibaricus* (Megascolecidae), *Ocnodrilus occidentalis* (Ocnodrilidae), *Dichogaster bolauai*, *Ramiella bishambari*, *Octochaetona papiensis* (Octochaetidae).Paliwal and Julka (27), have provided detailed distributional records at district

level under the western Himalayan states of Jammu & Kashmir, Himachal Pradesh and Uttarakhand, and a total 51 species of earthworms belonging to 23 genera and seven families from the western Himalaya which can be seen in the provided checklist (see Table-1). Dhiman & Battish (16), reported thirty species of earthworms viz., *Eudrilus eugeniae*, *Allolobophora caliginosa caliginosa*, *A. parva*, *Dendrodrilus rubidus*, *Eisenia fetida*, *Octolasion tyrtaeum*, *Amynthas alexandri*, *A. corticis*, *A. gracilis*, *A. morrisi*, *Lampito mauritii*, *Metaphire houlleti*, *M. posthuma*, *Polypheretima elongata*, *Perionyx bainii*, *P. barotensis* (Julka,1993), *P. excavates*, *P. sansibaricus*, *P. simlaensis*, *Gordiodrilus elegans peguanus*, *Ocnodrilus occidentalis*, *Dichogaster bolauai*, *Eutyphoeus ibrahimi*, *E.*

Table 2
Earthworms of Orrisa, India (Julka & Senapati, 1987).

Families	Genera	Earthworm spesies
A). Moniligastridae	<i>i. Drawida</i>	1. <i>D. calebi</i> 2. <i>D. willsi</i> 3. <i>D. lamella</i>
B). Almidae C). Megascolecidae	<i>Glyphidrilus</i> <i>Lampito</i> <i>iv. Metaphire</i> <i>v. Perionyx</i>	4. <i>G. tuberosus</i> (Steph, 1911) 5. <i>L. mauritii</i> (Kin, 1866) 6. <i>M. posthuma</i> (Vaill, 1868) 7. <i>P. excavates</i> (Perr, 1872) 8. <i>P. millardi</i> (Steph, 1915) 9. <i>P. sansibaricus</i> (Mich, 1891)
D). Acanthodrilidae E). Ocnerodrilidae	<i>vi. Pontodrilus</i> <i>vii. Deccania</i> <i>viii. Malabaria</i> <i>Ocnerodrilus</i> <i>Thatonia</i>	10. <i>P. bermudensis</i> (Bedd, 1891) 11. <i>D. alba</i> (Gates, 1949) 12. <i>M. biprosolata</i> (Aiyer, 1929) 13. <i>M. sulcata</i> (Gates, 1945) 14. <i>O. occidentalis</i> (Eisen, 1878) 15. <i>T. bolangirensis</i> (Julka, 1976) 16. <i>T. gracilis</i> (Gates, 1942) 17. <i>T. sambalpurensis</i> (Julka, 1976)
F). Octochaetidae	<i>Dichogaster</i> <i>Eutyphoeus</i> <i>Lenogaster</i> <i>Octochaetona</i> <i>Pellogaster</i> <i>Ramiella</i>	18. <i>D. affinis</i> (Mich, 1890) 19. <i>D. bolau</i> (Mich, 1891, 72) 20. <i>D. modiglianii</i> (Rosa, 1896, & 1972) 21. <i>E. incommodus</i> (Bedd, 1910) 22. <i>E. kherai</i> (Julka, 1978) 23. <i>L. pusillus</i> (Steph, 1920) 24. <i>O. barkudensis</i> (Steph, 1916) 25. <i>O. beatrix</i> (Bedd, 1902) 26. <i>O. surensis</i> (Mich, 1910) 27. <i>P. bengalensis</i> (Mich, 1910) 28. <i>R. bishambari</i> (Steph, 1914) 29. <i>R. sundargarhensis</i> (Julka, 1978).

incommodus, *E. waltoni*, *Lenogaster chittagongensis*, *L. pusillus*, *Octochaetona beatrix*, *Ramiella bishamarensis*, *Drawida japonica*, from Punjab and the union territory of Chandigarh. Sathianarayanan and Khan (32), have also surveyed out a total ten species with seven genera under five families viz., *Draewida willsi*, (Michaelsen), *D. limella* (Gates), *D. scandens* (Rao), from Moniligastridae, *Pontoscolex corethrurus* (Muller) from Glossocolecidae, *Lampito mauritii* (Kinberg), *Perionyx excavates* (Perrier) from Megascolecidae, *Pontodrilus bermudensis* (Beddard), *Octochaetona serreta* (Gates), *O. barnesi* (Stephenson) form Octochaetidae; and *Eudrilus Eugenia* (Kinberg) from Eudrilidae during October 2000 to September 2002 in eleven different habitats namely-paddy field, coconut field, saline soil area, municipal solid waste dumped area, groundnut field poultry waste dumped area, vermiculture area, cowdung dumped area, near fresh water bodies, sewage water canals and industrial area. Sharma & Gupta (34), have surveyed out eight species of earthworms viz., *Metaphire posthuma*, *Megascolex mauritii*, *Perionyx excavates*, *P. sansibaricus*, *Eutyphoeus waltoni*, *E. paivai*, *E. gigas*, and *E. incommodus* from dense forest area of Uttar Pradesh state of India. Bandyopadhyay *et. al.* (2), have reported 11 earthworm species from the district of North 24 Parganas of West Bengal, viz., *Lampito mauritii*, *Metaphire houlleti*, *M. posthuma*, *Perionyx excavates*, *Eutyphoeus orientalis*, *E. nicholsoni*, *E. incommodus*, *E. waltoni*, *Amyntas diffringens*, *Drawida nepalensis*, and *Glyphidrilus tuberosus*. Agrawal and Agrawal (1), have reported twenty-two species of earthworms from different localities and habitats of Gwalior. They

confirmed and identified a total 18 species (*Metaphire posthuma*, *M. birmanica*, *M. houletti*, *Amyntas alexandri*, *A. morrisi*, *Perionyx excavates*, *P. cessiseptatus*, *Lampito mauritii*, from family Megascolecidae and *Octochaetona Beatrix*, *O. paliensis*, *O. pattoni*, *O. rosea*, *O. thurstoni*, *Pellogaster bengalensis*, and *Eutyphoeus waltoni*, from Octochaetidae family, belonging to 10 genera and 05 families of earthworms. Although, rest species belonging to Megascolecidae and Octochaetidae, they could not have identified. Singh *et. al.* (37), have surveyed out seven species of earthworms viz., *Metaphire posthuma*, *Megascolex mauritii*, *Perionyx excavates*, *P. sansibaricus*, *Eutyphoeus waltoni*, *E. paivai*, *E. gigas*, and *E. pharpiangianus*, from agricultural land, grassland and orchard land areas Bareilly region of Uttar Pradesh, state. Verma *et. al.* (42), have made an extensive survey of Gangetic plain of Uttar Pradesh state during August-October, 2008 and reported 11 taxa of earthworms, namely, *Eutyphoeus incommodus*, *E. orientalis*, *E. pharpiangianus*, *E. waltoni*, *Lampito mauritii*, *Metaphire anomala*, *M. birmanica*, *M. posthuma*, *Pellogaster bengalensis*, *Perionyx sansibaricus*, *Polypheretima elongata*, belonging to 06 genera and 02 families that were commonly found in the study area. Recently, Prakash (29), has discussed a total 50 species of earthworms of Uttar Pradesh state of India, which are clearly depicted in Table-4. Although, most of the researchers of the world follow the taxonomic work of Stephenson (38), for earthworm identification. Thereby some of the worm's genera such as *Malabaria*, *Ocnerodrilus*, *Thatonia*, *Curgia*, *Dichogaster*, *Amyntas*, *Metaphire (Pheretima)*, *Perionyx*, and

Table 3
 A summary of studies, carried out by different authors in various parts of India

S.no.	Study area/region	Authors	Earthworm species surveyed
1.	Humid tropical deciduous wood land	Reddy (1987)	<i>Amyntas alexandari</i> , <i>A. diffringens</i> , <i>Metaphire posthuma</i> , <i>M. houlleti</i> , and <i>Dichogaster</i> sps.
2.	Shifting agriculture in Shillong	Bhaduria & Ramakrishnan (1989)	<i>Amyntas diffringens</i> , <i>Drawida assamensis</i> , <i>Eutyphoeus festivus</i> , <i>Nelloscolex strigosus</i> , and <i>Tonoscolex horarii</i> .
3.	Mid elevation village landscape of central Himalaya	Bhaduria <i>et al.</i> (2000)	<i>Bimastus parvus</i> , <i>Octolasion tyrtaeum</i> , <i>Octochaetona beatrix</i> , <i>Amyntas corticis</i> , <i>Eutyphoeus festivus</i> , <i>E. nainianus</i> , <i>E.waltoni</i> , and <i>Drawida</i> sps. 51 sps. as described earlier in Table-1.
4.	Western Himalaya, India	Paliwal & Julka (2005)	<i>Drawida willsi</i> , <i>D. lamella</i> , <i>D. scandens</i> , <i>Pontodrilus bermudensis</i> , <i>Pontoscolex corethrurus</i> , <i>Lampito mauritii</i> , <i>Perionyx excavatus</i> , <i>Eudrilus eugeniae</i> , <i>Octochaetona serreta</i> , and <i>O. barnesi</i> .
5.	Pondicherry region, India	Sathianarayanan & Khan (2006)	<i>Lenogaster pusillus</i> , <i>Metaphire houlleti</i> , <i>M. anomala</i> , <i>Ocnodrilus occidentalis</i> , <i>Dendrodrilus rubidus</i> , <i>Apporrectodea caliginosa</i> , <i>Amyntas corticis</i> , <i>Drawida nepalensis</i> , <i>D. somavarapatan</i> , <i>D. modesta</i> , <i>D. fakir</i> , <i>D. pellucid</i> , <i>Lampito mauritii</i> , <i>Megascolex curgensis</i> , <i>M. feliciseta</i> , <i>Octochaetoides castellans</i> , <i>Pontoscolex corethrurus</i> and <i>Curgia narayani</i> .
6.	Nandadevi and Nilgiri biosphere reserves of India	Kale <i>et al.</i> (2009)	<i>Metaphire posthuma</i> , <i>M. birmanica</i> , <i>M. houlleti</i> , <i>Amyntas alexandri</i> , <i>A. morrisi</i> , <i>Perionyx excavates</i> , <i>P. cressiseptatus</i> , <i>Lampito mauritii</i> , <i>Octochaetona Beatrix</i> , <i>O. paliensis</i> , <i>O. pattoni</i> , <i>O. rosea</i> , <i>O. thurstoni</i> , <i>Pellogaster bengalensis</i> , and <i>Eutyphoeus waltoni</i> .
7.	Gwalior region of Madhya Pradesh	Agrawal & Agrawal (2009)	<i>Eutyphoeus incommodus</i> , <i>E.orientalis</i> , <i>E. pharpingianus</i> , <i>E. waltoni</i> , <i>Lampito mauritii</i> , <i>Metaphire anomala</i> , <i>M. birmanica</i> , <i>M. posthuma</i> , <i>Pellogaster bengalensis</i> , <i>Perionyx sansibaricus</i> , and <i>Polypheretima elongate</i> .
8.	Gangetic plain of Uttar Pradesh, India	Verma <i>et al.</i> (2010)	<i>Metaphire posthuma</i> , <i>Perionyx excavates</i> , <i>Lampito mauritii</i> , <i>Eutyphoeus waltoni</i> , <i>E. pharpingianus</i> , <i>E. gigas</i> , and <i>E. orientalis</i> .
9.	Western Uttar Pradesh state of India	Singh & Prakash (2012)	<i>Pontoscolex corethrurus</i> , <i>Amyntas morrisi</i> , <i>Metaphire posthuma</i> , <i>Lampito mauritii</i> , <i>Perionyx sansibaricus</i> , <i>Ocnodrilus occidentalis</i> , <i>Dichogaster bolau</i> , <i>Ramiella bishambari</i> , and <i>Octochaetona paliensis</i> .
10.	Arid regions of Rajasthan	Tripathi & Bhardwaj (2004)	<i>Lampito mauritii</i> , <i>Metaphire houlleti</i> , <i>M. posthuma</i> , <i>Perionyx excavates</i> , <i>Eutyphoeus orientalis</i> , <i>E. nicholsoni</i> , <i>E. incommodus</i> , <i>E. waltoni</i> , <i>Amyntas diffringens</i> , <i>Drawida nepalensis</i> , and <i>Glyphidrilus tuberosus</i> .
11.	Earthworms of North 24 Parganas, West Bengal	Bandyopadhyay <i>et al.</i> (2008)	<i>Eudrilus eugeniae</i> , <i>Allolobophora caliginosa caliginosa</i> , <i>A. parva</i> , <i>Dendrodrilus rubidus</i> , <i>Eisenia fetida</i> , <i>Octolasion tyrtaeum</i> , <i>Amyntas alexandri</i> , <i>A. corticis</i> , <i>A. gracilis</i> , <i>A. morrisi</i> , <i>Lampito mauritii</i> , <i>Metaphire houlleti</i> , <i>M. posthuma</i> , <i>Polypheretima elongate</i> , <i>Perionyx bainii</i> , <i>P. barotensis</i> (Julka, 1993), <i>P. excavates</i> , <i>P. sansibaricus</i> , <i>P. simlaensis</i> , <i>Gordiodrilus elegans peguanus</i> , <i>Ocnodrilus occidentalis</i> , <i>Dichogaster bolau</i> , <i>Eutyphoeus ibrahimi</i> , <i>E. incommodus</i> , <i>E. waltoni</i> , <i>Lenogaster chittagongensis</i> , <i>L. pusillus</i> , <i>Octochaetona beatrix</i> , <i>Ramiella bishamarensis</i> , <i>Drawida japonica</i>
	Earthworms of northern Indian states	Dhiman & Battish (2005)	

Eutyphoeus were simultaneously put into the family-Megascolecidae, belonging to sub families-Ocnodrilinae, Ocnodrilinae, Ocnodrilinae, Ocnodrilinae, Ocnodrilinae, Octochaetinae, Megascolecinae, Megascolecinae, and Octochaetinae, respectively (38); while these genera were identified and put into Ocnodrilidae, Ocnodrilidae, Ocnodrilidae, Ocnodrilidae, Octochaetidae, Octochaetidae, Octochaetidae, Octochaetidae, and Octochaetidae, respectively, by Paliwal & Julka (27). Although, *Glyphidrilus* genus was put

into family-Lumbricidae under sub family-Microchaetinae by Stephenson (38). However, it was described by Paliwal & Julka (27) & Bandyopadhyay *et. al.* (2), under the family- Almidae and therefore, it should be included, classified, and counted into the family- Almidae by latest research work (See Table-2).

Table 4
Checklist of earthworm fauna of Uttar Pradesh state of India (Prakash, 2017)

Serial No.	Earthworm species	Family
1.	<i>Aulophorus tonkinensis</i> (Vejd, 1909)	Naidae
2.	<i>Branchiodrilus hortensis</i> (Stephenson, 1910)	Naidae
3.	<i>Dero limosa</i> (Leidy, 1914)	Naidae
4.	<i>Dichogaster bolauii</i> (Michaelsen, 1891)	Naidae
5.	<i>Nais communis</i> (Piguet.), var. <i>Punjabensis</i> (Stephenson, 1909)	Naidae
6.	<i>Nais obtuse</i> (Gerv, 1909)	Naidae
7.	<i>Nais var. inaequalis</i> (Stephenson, 1911)	Naidae
8.	<i>Pristina aequiseta</i> (A.G. Bourne, 1889)	Naidae
9.	<i>Haemonais laurentii</i> (Stephenson, 1915)	Naidae
10.	<i>Aulodrilus kashi</i> (Mehra, 1922)	Tubificidae
11.	<i>Aulodrilus stephensoni</i> (Mehra, 1922)	Tubificidae
12.	<i>Branchiura sowebyi</i> (Beddard, 1912)	Tubificidae
13.	<i>Allolobophora papillatus</i> (Eisen, 1909)	Lumbricidae
14.	<i>Glyphidrilus tuberosus</i> (Stephenson, 1916)	Lumbricidae
15.	<i>Glyphidrilus papillatus</i> (Rosa, 1890)	Lumbricidae
16.	<i>Pontoscolex corethrurus</i> (Michaelsen, 1898)	Lumbricidae
17.	<i>Eisenia fetida</i> (Savigny, 1891)	Lumbricidae
18.	<i>Amyntas morrisi</i> (Beddard, 1892)	Megascolecidae
19.	<i>Lampito mauritii</i> (Kinberg, 1866)	Megascolecidae
20.	<i>Metaphire posthuma</i> (Vaillant, 1868)	Megascolecidae
21.	<i>Metaphire houlleti</i> (Perrier, 1872)	Megascolecidae
22.	<i>Metaphire anomala</i> (Michaelsen, 1907)	Megascolecidae
23.	<i>Metaphire birmanica</i> (Rosa, 1888)	Megascolecidae
24.	<i>Metaphire elongata</i> (Perrier, 1909)	Megascolecidae
25.	<i>Perionyx excavatus</i> (Perrier, 1872)	Megascolecidae
26.	<i>Perionyx sansibaricus</i> (Michaelsen, 1891)	Megascolecidae
27.	<i>Polypheretima elongate</i> (Perrier, 1872)	Megascolecidae
28.	<i>Oncodrilus occidentalis</i> (Eisen, 1878)	Megascolecidae
29.	<i>Malabarisa sulkata</i> (Gates, 1945)	Megascolecidae
30.	<i>Lenogaster pusillus</i> (Stephenson, 1920)	Octochaetidae
31.	<i>Pellogaster bengalensis</i> (Michaelsen, 1910)	Octochaetidae
32.	<i>Eutyphoeus incommodus</i> (Beddard, 1901)	Octochaetidae
33.	<i>Eutyphoeus mohammedi</i> (Stephenson, 1914)	Octochaetidae
34.	<i>Eutyphoeus waltoni</i> (Michaelsen, 1907)	Octochaetidae
35.	<i>Eutyphoeus masoni</i> (Bourne, 1889)	Octochaetidae
36.	<i>Eutyphoeus pharpiangianus</i> (Michaelsen, 1907)	Octochaetidae
37.	<i>Eutyphoeus orientalis</i> (Beddard, 1883)	Octochaetidae
38.	<i>Eutyphoeus paivai</i> (Michaelsen, 1907)	Octochaetidae
39.	<i>Eutyphoeus nicholsoni</i> (Beddard, 1901)	Octochaetidae
40.	<i>Eutyphoeus gigas</i> (Stephenson, 1917)	Octochaetidae
41.	<i>Eudichogaster ashworthi</i> (Michaelsen, 1902)	Octochaetidae
42.	<i>Eudichogaster parvus</i> (Fedarb, 1898)	Octochaetidae
43.	<i>Eudichogaster prashadi</i> (Stephenson, 1920)	Octochaetidae
44.	<i>Ramiella bishambari</i> (Stephenson, 1914)	Octochaetidae
45.	<i>Octochaetus fermori</i> (Michaelsen, 1907)	Octochaetidae
46.	<i>Octochaetus paliensis</i> (Stephenson, 1920)	Octochaetidae
47.	<i>Octochaetona Beatrix</i> (Beddard, 1902)	Octochaetidae
48.	<i>Octochaetona surensis</i> (Michaelsen, 1910)	Octochaetidae
49.	<i>Drawida calebi</i> (Gates, 1945)	Moniligasteridae
50.	<i>Drawida willsi</i> (Michaelsen, 1907)	Moniligasteridae

Table 5
Earthworm species of different parts of India

Serial No.	Earthworm species	Family
1.	<i>Aulophorus tonkinensis</i> (Vejd, 1909)	Naidae
2.	<i>Branchiodrilus hortensis</i> (Stephenson, 1910)	-do-
3.	<i>Dero limosa</i> (Leidy, 1914)	-do-
4.	<i>Nais communis</i> (Piguet.), var. <i>Punjabensis</i> (Stephenson, 1909)	-do-
5.	<i>Nais obtusa</i> (Gerv, 1909)	-do-
6.	<i>Nais var. inaequalis</i> (Stephenson, 1911)	-do-
7.	<i>Pristina aequiseta</i> (A.G. Bourne, 1889)	-do-
8.	<i>Haemonais laurentii</i> (Stephenson, 1915)	-do-

9.	<i>Aulodrilus kashi</i> (Mehra, 1922)	Tubificidae
10.	<i>A. stephensoni</i> (Mehra, 1922)	-do-
11.	<i>Branchiura sowerbyi</i> (Beddard, 1912)	-do-
12.	<i>Glyphidrilus tuberosus</i> (Stephenson, 1916)	Lumbricidae
13.	<i>G. papillatus</i> (Rosa, 1890)	-do-
14.	<i>Glyphidrilu sps. gangeticus</i> (Gates, 1958)	-do-
15.	<i>Pontoscolex corethrurus</i> (Michaelsen, 1898)	-do-
16.	<i>Eisenia fetida</i> (Savigny, 1891)	-do-
17.	<i>Apporrectodea caliginosa caliginosa</i>	-do-
18.	<i>A. caliginosa trapezoides</i>	-do-
19.	<i>A. rosea rosea</i>	-do-
20.	<i>Allolobophora eiseni</i>	-do-

21.	<i>Parva</i>	-do-
22.	<i>Papillatus</i>	-do-
23.	<i>Dendrobaena hortensis</i>	-do-
24.	<i>D. octaedra</i>	-do-
25.	<i>Dendrodrilus rubidus</i>	-do-
26.	<i>Eiseniella tetraedra tetraedra</i>	-do-
27.	<i>Lumbricus castaneus</i>	-do-
28.	<i>L. terrestris</i>	-do-
29.	<i>Octolasion cyaneum</i>	-do-
30.	<i>O. tyrtaeum</i>	-do-
31.	<i>Bimostus parvus</i>	-do-
32.	<i>Eudrilus eugeniae</i>	-do-
33.	<i>Amyntas morrisi (Beddard,1892)</i>	Megascolecidae
34.	<i>A. gracilis</i>	-do-
35.	<i>A. corticis</i>	-do-
36.	<i>A. alexandri</i>	-do-
37.	<i>A. diffringens</i>	-do-
38.	<i>Lampito mauritii (Kinberg,1866)</i>	-do-
39.	<i>Metaphire posthuma (Vaillant,1868)</i>	-do-
40.	<i>M. houletti (Perrier, 1872)</i>	-do-
41.	<i>M. anomala (Michaelsen, 1907)</i>	-do-
42.	<i>M. birmanica (Rosa,1888)</i>	-do-
43.	<i>M. elongata (Perrier, 1909)</i>	-do-
44.	<i>Perionyx excavates (Perrier, 1872)</i>	-do-
45.	<i>P. sansibaricus (Michaelsen, 1891)</i>	-do-
46.	<i>P. bainii</i>	-do-
47.	<i>P. parotensis</i>	-do-
48.	<i>P. nainianus</i>	-do-
49.	<i>P. simlaensis</i>	-do-
50.	<i>P. millardi</i>	-do-
51.	<i>P. cressiseptatus</i>	-do-
52.	<i>Polypheretima elongata (Perrier, 1872)</i>	-do-
53.	<i>Malabarisa sulkata (Gates,1945)</i>	-do-
54.	<i>M. levis</i>	-do-
55.	<i>M. biprosolata</i>	-do-
56.	<i>Megscolex curgensis</i>	-do-
57.	<i>M. mauritii</i>	-do-
58.	<i>M. filiciseta</i>	-do-
59.	<i>Curgia narayani</i>	-do-
60.	<i>Nelloscoclex strigosus</i>	-do-
61.	<i>Tonoscolex horaii</i>	-do-
62.	<i>Lenogaster pusillus (Stephenson, 1920)</i>	Octochaetidae
63.	<i>L. chittagongensis</i>	-do-
64.	<i>L. parvus</i>	-do-
65.	<i>L. yeicus</i>	-do-
66.	<i>Pellogaster bengalensis (Michaelsen, 1910)</i>	-do-
67.	<i>Dichogaster bolau (Michaelsen,1891)</i>	-do-
68.	<i>D. affinis</i>	-do-
69.	<i>D. modiglianii</i>	-do-
70.	<i>Dichogaster sps.</i>	-do-
71.	<i>Eutyphoeus incommodus (Beddard,1901))</i>	-do-
72.	<i>E. mohammedi (Stephenson, 1914)</i>	-do-
73.	<i>E. waltoni (Michaelsen, 1907)</i>	-do-
74.	<i>E. masoni (Bourne,1889)</i>	-do-
75.	<i>E. pharpiangianus (Michaelsen,1907)</i>	-do-
76.	<i>E. orientalis (Beddaard,1883)</i>	-do-
77.	<i>E. paivai (Michaelsen, 1907))</i>	-do-
78.	<i>E. nicholsoni (Beddard,1901)</i>	-do-
79.	<i>E. gigas (Stephenson, 1917)</i>	-do-
80.	<i>E. annandalei</i>	-do-
81.	<i>E. nainianus</i>	-do-
82.	<i>E. kherai</i>	-do-
83.	<i>E. festivus</i>	-do-
84.	<i>E. ibrahimi</i>	-do-
85.	<i>Eudichogaster ashworthi (Michaelsen, 1902)</i>	-do-
86.	<i>E. parvus (Fedarb, 1898)</i>	-do-

87.	<i>E. prashadi (Stephenson, 1920)</i>	-do-
88.	<i>Ramiella bishambarensis (Stephenson, 1914)/bishambari</i>	-do-
89.	<i>R. sundargarhensis</i>	-do-
90.	<i>Octochaetus fermori (Michaelsen, 1907)</i>	-do-
91.	<i>O. paliensis (Stephenson, 1920)</i>	-do-
92.	<i>Octochaetona Beatrix (Beddard, 1902)</i>	-do-
93.	<i>O. surensis (Michaelsen, 1910)</i>	-do-
94.	<i>O. barkudensis</i>	-do-
95.	<i>O. serreta</i>	-do-
96.	<i>O. barnesi</i>	-do-
97.	<i>O. paliensis</i>	-do-
98.	<i>O. pattoni</i>	-do-
99.	<i>O. rosea</i>	-do-
100.	<i>O. thurstoni</i>	-do-
101.	<i>Octochaetoides castellans</i>	-do-
102.	<i>Drawida calebi (Gates, 1945)</i>	Moniligasteridae
103.	<i>D. willsi (Michaelsen, 1907)</i>	-do-
104.	<i>D. japonica</i>	-do-
105.	<i>D. nepalensis</i>	-do-
106.	<i>D. lamella</i>	-do-
107.	<i>D. assamensis</i>	-do-
108.	<i>D. scandens</i>	-do-
109.	<i>D. somavarapatan</i>	-do-
110.	<i>D. modesta</i>	-do-
111.	<i>D. fakir</i>	-do-
112.	<i>D. pellucida</i>	-do-
113.	<i>Drawida sps.</i>	-do-
114.	<i>Ocnerodrilus occidentalis (Eisen,1878)</i>	-do-
115.	<i>Thatonia exilis</i>	Ocnerodrilidae
116.	<i>T. gracilis</i>	-do-
117.	<i>T. bolangirensis</i>	-do-
118.	<i>T. sambalpurensis (Julka, 1976)</i>	-do-
119.	<i>Deccania alba</i>	-do-
120.	<i>Gordiodrilus elegans peguanus</i>	-do-
121.	<i>Pontodrilus bermudensis</i>	Acanthodrilidae
122.	<i>Microscolex phosphoreus</i>	-do-
123.	<i>Plutellus sadhupulensis (Julka & Paliwal, 1994)</i>	-do-

4. Conclusion

Abundant species of earthworms viz., *Eutyphoeus waltoni*, *Metaphire posthuma*, *Perionyx excavates*, *Lampito mauritii*, were noticed in every parts of India in different habitats in general. Although, some other worm' s species of *Amyntas*, *Metaphire*, *Drawida*, and *Eutyphoeus* genera were also distributed, approximately in all the regions of the country (see Table 1, 2, 3, & 4). It is clearly may be concluded that western Himalayan region, Orissa state as well as Uttar Pradesh state were found as mega diversity regions for earthworms as 51, 29 and 50, species have been recorded. Although, further research work is needed for identifying mega diversity regions of India and earthworm species. Therefore, young researchers of the related field should try for searching out new species of earthworms and find out exact species of earthworms of different parts of India as well.

Acknowledgements

The author is heartily thankful to Mrs. Ram Pyari Verma, his wife which given an idea of present review report. Author is also thankful to Mr. Praveen Kumar, Department of Botany and

Dr.Elyas, Department of Chemistry ,H.R.P. Degree college, Barkhera (Pilibhit), U.P., India, for useful suggestions.

References

- [1] Agrawal, D. and Agrawal, O. P. (2009). A study of the biodiversity of earthworms in and around Gwalior, Madhya Pradesh. In: *Earthworm Ecology and Environment* (ed.S.M.Singh), IBDC., Lucknow p.15-24.
- [2] Bandyopadhyay, P.K., Mandal, C.K. and Mitra, A. K. (2008). Earthworms of north 24 Parganas, West Bengal. *Rec. Zool. Surv. India*:108 (Part-3):21-25.
- [3] Bano, K. and Kale, R.D. (1991). Earthworm fauna of south Karnataka, In: *Advances in management and conservation of soil fauna*, Oxford and IBH Publication, 627-634.
- [4] Bhadauria, T, Ramakrishna, P.S. and Srivastava, K.N. (2000). Diversity and distribution of endemic and exotic earthworms in natural and regeneration ecosystems in the central Himalaya, India. *Soil Biol. and Biochem* 32:2045-2054.
- [5] Blakemore, R.J. (2000). Tasmanian earthworms, CD ROM Monograph with Review of world families, *Verm Ecology*, POBOX414 Kippax (Canberra, Australia).
- [6] Blakemore, R. J. (2002). *Verm Ecology*, POBOX414 Kippax (Canberra, Australia).
- [7] Blakemore, R.J. (2003). Japanese earthworms (Annelida: Oligochaeta): A review and checklist of species. *Org. Diver. Evol.*, 11, 1-43.
- [8] Blakemore, R.J., Chang, C.H., Chen, J.H., Chuang, S.C., Masamich, T., Ito, S.J. and Sheng, W. H. (2006). Biodiversity of earthworms in Taiwan: a species checklist with the confirmation and new records of the exotic lumbricids *Eisenia fetida* and *Eiseniella tetraedra*, *Taiwania*, (51), 226-236.
- [9] Blanchart, E. and Julka, J.M. (1997). Influence of forest disturbance on earthworm (Oligochaeta) communities in the Western Ghats (south India). *Soil Biol. and Biochem.* 29:303-306.
- [10] Bhaduria, T. and Ramakrishnan, P.S. (1989). Earthworm population dynamics and contribution to nutrient cycling during cropping and fallow phases of shifting agriculture (Jhum) in North East India, *J. Appl. Ecol.* 26, 505-520.
- [11] Chaudhuri, P.S. and Bhattacharjee, G. (1999). Earthworm resources of Tripura. *Proc. Nat. Acad. Sci. India*, 69 (B), II, 159-70.
- [12] Chang, C.H. and Chen, J. H. (2004). A new species of earthworm belonging to the genus *Metaphire* Sims and Easton (Oligochaeta: Megascolecidae) from southern Taiwan, *Taiwania*, (49), 219-224.
- [13] Chang, C.H. and Chen, J.H. (2005a). Three new species of Octothecate Pheretimid earthworms from Taiwan, with discussion on the biogeography of related species. *J. Nat. Hist.* (39), 1469-1482.
- [14] Chang, C.H. and Chen, J.H. (2005b). Taxonomic status and intraspecific phylogeography of two sibling sps. of *Metaphire* (Oligochaeta: Megascolecidae), in Taiwan, *Pedobiologia*, (49), 591-600.
- [15] Curry, J.P., Byrne, D. and Schmidt, O. (2002). Intensive cultivation can drastically reduce earthworm populations in arable land, *European Journal of Soil Biology*, (38), 127-130.
- [16] Dhiman, N. and Battish, S. K. (2005). Earthworms from northern Indian states with *Onciderilus occidentalis*, Eisen, 1878 as a new report from Punjab. *ZOOS' PRINT JOURNAL* 21(1)2135-2137.
- [17] Gates, G.E. (1972). Burmese earthworms. An introduction to the systematics and biology of Megadrili Oligochaetes with special reference to Southeast Asia. *Trans. Am. Phill. Sec.*, 62 (7): 1-326.
- [18] Ganihar, S. R. (1996). Earthworm distribution with special reference to physico-chemical parameters. *Proc. Ind. Nat. Sci. Acad.*, 62:11-18.
- [19] Ismail, S.A., Ramakrishna, and Anzar, M.M. (1990). Density and diversity in relation to the distribution of earthworms in Madras, *Proc. Ind. Acad. Science (Animal Science)*, 73-78.
- [20] Julka, J.M. (1993). Earthworm Resources of India and their utilization in Vermiculture. *Earthworm Resources and Vermiculture*: 51-56.
- [21] Julka, J. M. (2001). Distribution of earthworms in different agro-climatic regions of India. Workshop on Tropical Soil Biology and fertility programme. School of Environmental Science, J.N.U., New Delhi, p.1-12.
- [22] Julka, J.M. (2005). Earthworms as bioindicators in conservation areas. In: National Seminar on vermotechnology and waste management (Eds., Rajasheker Patil and Ramesh chandra Rao), Dept. Appl. Zool. Mangalore Univ. Mangalore sponsored by DBT, New Delhi, 28-29th January.
- [23] Julka, J.M. and Senapati, B.K. (1987). Records of Zoological Survey of India: Earthworms (Oligochaeta: Annelida) of Orissa, India. Miscellaneous Publication (Occasional Paper No.92), Published by the Director, ZSI, Calcutta.
- [24] Kale, R. D. (1997). Earthworms and soil. *Proc. Nat. Acad. Sci., India*, 67, 13-24.
- [25] Kale, R.D., Kumar, N.G., Senapati, B.K. Verma, R.V., Maikhuri, M.S., Dinesh, M.S., Guruprasad, H., Rahman, P.M., Dangwal, D. and Mishra, S. (2009). Inventory of Macro fauna in different land use systems in the Nilgiri and Nandadevi Biosphere Reserves in India, *Journal of Soil Biology and Ecology (Special volume)*, 23-75.
- [26] Kaushal, B.R., Kandpal, B., Bisht, S.P.S., Bora, S. and Dhapora, R. (1999). Abundance and seasonal activity of earthworms in crop lands of Kumaon Hialayas. *European Journal of Soil Biology*, 35, 171-176.
- [27] Paliwal, R. and Julka, J.M. (2005). Checklist of earthworms of western Himalaya, India, *ZOOS' PRINT JOURNAL*, 20 (9), 1972-1976.
- [28] Patnaik, H.P., Panda, S. and Samal, M. (2004). Preliminary studies on the earthworm species of Kendujhar (Orissa), *J. Appl. Zool. Researchs*, 15, 91-95.
- [29] Prakash, O. (2017). Biodiversity of earthworms and their distribution in different regions of Uttar Pradesh state of India, *IOSR Journal of Pharmacy*, 7 (1), 01-09.
- [30] Reddy, M.V. (1987). Seasonal structure of earthworm (*Pheretima spp.*) populations in a humid tropical deciduous woodland. In: Bonvicini Padliai AM, Omodeo P (eds) On selected earthworms. Symposia and Monographs U.Z.I., 2 Mucchi, Modena, pp. 191-197
- [31] Reynolds, J.W. (1994). The distribution of the earthworms (Oligochaeta) of Indiana: A case for the post-quaternary introduction theory for megadrile migration in North America. *Megadrilologica*, 5: 13-32.
- [32] Sathianarayanan, A. and A.K. Khan. (2006). Diversity, distribution and abundance of earthworms in Pond cherry region. *Tropical Ecology* 47:139-144.
- [33] Sautter, K.D., Brown, G.G. James, S.W., Pasini, A., Nunes, D.H. and Benito, N.P. (2006). Present knowledge on earthworm biodiversity on the state of Parana, Brazil, *European Journal of Soil Biology* (42), 296-300.
- [34] Sharma, V.S. and Gupta, S. (2007). Density, diversity and population dynamics of earthworm species in dense forest area of Uttar Pradesh. In *the proceedings of National Conference on Environmental Safety for sustainable Future* (NCFSSF), p.27-28.
- [35] Singh, J. (1997). Habitat preferences of selected Indian earthworm species and their efficiency in reduction of organic materials. *Soil Biology and Biochemistry*, Vol.29 (3-4):585-588.
- [36] Singh, S. M. and O. Prakash, (2012). Species richness and density of earthworm population in grasslands of western Uttar Pradesh, India. *Zoology in the Middle East Supplementum* 4.p.111-118.
- [37] Singh, S.M., Prakash, O. and Gangwar, G.R. 2009. Density, diversity and population dynamics of earthworm species in Bareilly region of U. P. state. In: *Earthworm Ecology and Environment*, p.3-13.
- [38] Stephenson, J. (1923). The Fauna of British India including Ceylon and Burma. Oligochaeta. Taylor and Francis, London.
- [39] Tripathi, G. and P. Bhardwaj. (2004). Earthworm diversity and habitat preferences in arid regions of Rajasthan. *Zoos. Print. Journal.* 19 (7):1515-1519.
- [40] Tsai, C.F., Shen, H.P. and Tsai, S.C. (1999). On some new species of the Pheretimid earthworms (Oligochaeta: Megascolecidae, from Taiwan. *J. Nat. Taiwan. Museum*, (52), 33-46.
- [41] Tsai, C.F., Shen, H.P. and Tsai, S.C. (2000). Native and exotic species of terrestrial earthworms (Oligochaeta) in Taiwan with reference to northeast Asia. *Zool Stud.* (39), 285-294.
- [42] Verma, D., S. Bharti and S. Yadav. (2010). Biodiversity of earthworm resources in Gangetic plain of Uttar Pradesh, India. *Tropical Natural History* 10 (1):53-60.