

NEW RECORD OF THE EARTHWORM *EISENIA FETIDA* (SAVIGNY, 1826) FROM KASHMIR VALLEY, JAMMU AND KASHMIR, INDIA

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ABSTRACT

The earthworm *Eisenia fetida* is reported for the first time from the state of Jammu and Kashmir. The original range of the species is supposed from Russia. The species is epigeic and is found in the environments rich in organic matter, with patchy distribution. The life cycle of the earthworm is well documented because of its economic importance as the species is used in waste management.

INTRODUCTION

Earthworms are a major component of terrestrial ecosystems dominating the biomass of soil invertebrates in different soils (Edwards and Bohlen, 1996). They have been recognized as the most important soil ecosystem engineers (Lavelle *et al.*, 1997). The activities of earthworms in soils have been shown to have profound impact on the soil ecosystem functioning as well as on the types and numbers of micro-flora and micro-fauna (Perdesen and Hendriksen, 1993). The records on the earthworms of Indian subcontinent has been provided by Templeton (1844), Stephenson (1923), Gates (1972), Julka (1988), Bourne (1889) and on the earthworms of Kashmir Valley by Stephenson (1922) and Sharma and Kaul (1974).

In this study earthworms were collected from 20 different sites across Kashmir Valley. Critical examination of the specimens and other references have resulted in a species *E. fetida* which forms the first time record from the area and is an addition to the checklist of earthworms from Kashmir Valley, Jammu and Kashmir, India.

MATERIALS AND METHODS

Earthworm samples were collected by digging soil monolith (25 x 25 x 30 cm) and handsorting. Worms were sorted into clitellates, non-clitellates (> 4cm, without clitellum but have genital markings) and juveniles (< 4cm, lack of genital marking, tumescences and clitellum) (Zorn *et al.*, 2005), preserved in 4% formalin and sent to Zoological Survey of India (ZSI) for taxonomic identification. The specimens were deposited in the Museum, Department of Ecology and Environmental

Sciences, Pondicherry Central University, (DEES-A: 01/2009) housed in Kalapet, Puducherry, India.

RESULTS AND DISCUSSION

The diagnosis of *E. fetida* (Fig. 1) is as:

Length 60-90mm; diameter 3-4mm, with red purple or brown segmental bands over dorsum separated by paler intervals; the bands slightly marked in ix-xi, except middorsally; bands sometimes two per segment; ventral surface pale. Prostomium epilobous ½. Dorsal pore from 4/5. Setae slender, ornamental, closely paired; aa=bc; dd=half the circumference. Clitellum from xxiv, xxv, or xxvi to xxxii (=7-9). Ridges ("walls") at maturity on 3-4 segments, xxvii or ½ xxviii to xxx or xxxi. Male pore with fairly large raised areas which do not transgress the limits of xv. Spermathecal pores two pairs, in 9/10 and 10/11, near the middorsal line.

The original range of this species is supposed to be from the Caucasus to the forest-steppe zone of Russia (Perel, 1997) where it is an epigeic species occurring under bark of fallen trunks and in decaying organic material. Its present range comprises Europe, North America, South America, Africa, Asia and Australia. It is associated to environments with high organic matter content and their natural populations live at high densities in patchy distributions (Elvira *et al.*, 1996). The reproduction rate is 0.644 juvenile per adult per day (Csuzdi and Zicsi, 1988), the maturity takes 70-98 days (Zicsi, 1985) and under favorable condition an *E. fetida* population could progenerate three-four generations yearly. Life expectancy of this species is about 2.25 years (Zicsi, 1974) but a maximum of 4.5 years is also reported (Lee, 1985). The daily



Figure 1: *Eisenia fetida* collected from Srinagar and Anantnag (Jammu and Kashmir)

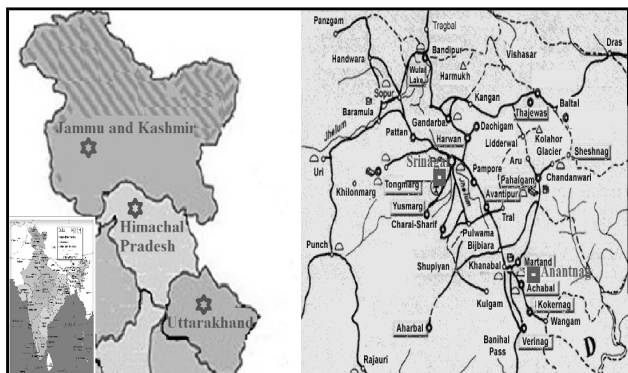


Figure 2: Geographical distribution of *Eisenia fetida*. Blue star- Himachal Pradesh and Uttarakhand (Previous report), Red star- Jammu and Kashmir (new record) and red square- Srinagar and Anantnag (collection sites)

consumption rate and cast production proved to be 71.51 ± 6.29 and 84.51 ± 14.14 mg dry mass per 1g living weight respectively (Csuzdi, 1988). The growth and reproduction of this earthworm species is affected by several factors such as food quality, moisture, temperature and population density, as showed under laboratory conditions (Dominguez, 2004). The basic aspect of the life cycle of *E. fetida* is relatively well documented due to its importance in waste management (Edwards, 2004). Studies on the use of the species for the management of wide variety of wastes include that of Pulikeshi *et al.*, (2003); Deka *et al.*, (2003); Kostecka and Kaniuczak, (2008). The species is also used for the production of vermiwash used as biofertilizer (Nath *et al.*, 2009).

Stephenson, (1923) reported *E. fetida* from Shimla and neighborhood (Himachal Pradesh), Kodaikanal and neighborhood, Palni Hills, Nilgiri Hills (Tamil Nadu), Ponnudi, Tranvancore (Kerala), Sevok (West Bengal) and Nicobar Islands. Paliwal and Julka, (2005) in the checklist of earthworms of Western Himalayas reported this species from Himachal Pradesh and Uttarakhand (previously Uttaranchal). During our studies on earthworm diversity and distribution in Kashmir Valley, we found the occurrence of *E. fetida* in Srinagar district (N34°16.573' and E074°52.972') and (N34°03.259' and

E074°47.483') and Anantnag district (N33°45.027' and E075°07.196') which is described here (Fig. 2). It is noteworthy that *E. fetida* has not so far been reported from state of Jammu and Kashmir and is new record. New sites comprise *Populus niger* plantation (1525 masl) and vegetable garden (1500 meters a.s.l) in Srinagar district and *Populus niger* plantation (1745 meters a.s.l) in Anantnag district. All the sites are rich in organic matter/leaf litter. The climate of the new sites records falls in temperate zone, characterized by wet and cold winter and relatively dry and moderate hot summer. The hottest months are July and August, when the maximum temperature rises above 30°C. September has cooler nights and the severe winter sets in about the middle of December. The coldest month is January, with temperature falling below freezing point. According to Julka, (1988) earthworms in India have been introduced to new areas by man, with the importation of soil-containing materials (plants, agricultural and horticultural products) and the species colonize successfully due to their inherent ability to withstand disturbance and interference.

CONCLUSION

Thus from the present study, *E. fetida* forms the first time record from Kashmir Valley and is an addition to the checklist of earthworms from state of Jammu and Kashmir.

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