

Life Science: Research, Practices and Application for Sustainable Development

Editors:
Dr P Ponmurugan
Dr V Ramasubramanian
Dr T Marimuthu



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Dr P Ponmurugan

Associate Professor
Department of Botany
Bharathiar University
Coimbatore – 641 046, Tamil Nadu, India.
E-mail: ponmurugan@buc.edu.in

Dr V Ramasubramanian

Associate Professor
Department of Zoology
Bharathiar University
Coimbatore – 641 046, Tamil Nadu, India.
E-mail: vraman68@rediffmail.com

Dr T Marimuthu

Secretary
National Academy of Biological Sciences &
Additional Director
World Noni Research Foundation
Chennai – 600 096, Tamil Nadu, India.
E-mail: secretarynabs@gmail.com



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Recent trends in Life Science

Research, Practices and Application for Sustainable Development

Editors

Dr. P. Ponmurugan

Dr. V. Ramasubramanian

Dr. T. Marimuthu

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Comaparitive Study on Earthworm Reproductive Potential of *Eudrilus Eugeniae* Using Different Media

T. Sandra Rajan,¹ M. P. Deepthi¹, K. Saminathan,² and P. Kathireswari^{1*}

ABSTRACT

Earthworms function as ecosystem engineers by structuring the soil environment, incorporating large amounts of litter and seeds into soil and, thereby influence the composition of plant communities. Hence the presence of earthworm in the soil is generally indicative of the soil fertility. The present study is focused on comparative study of reproductive potential of earthworm *Eudrilus eugeniae* in two different culture media viz elephant dung and cow dung and it reveals that the reproductive potential of earthworm *Eudrilus eugeniae* was higher in elephant dung when compared to cow dung.

Key words: Earthworms, reproductive potential, dung, *Eudrilus eugeniae*

Introduction

Earthworms are natural invertebrates of agro-ecosystem belonging to the phylum Annelida, class-Oligochaeta and dominant in the temperate and tropical soils. They are the first group of multicellular eucoelomate invertebrates to have succeeded to inhabit terrestrial environment (Kale and Karmegam 2010). Earthworms, are ecosystem engineers, play an important role in many soil ecosystems and are one of the numerous ranges of burrowing organisms, which improve soil fertility (Lavelle, 1997). They can able to convert the wastes in to fine mucus coated faecal pellets, popularly known as vermicast. This is quality organic manure rich in beneficial micro flora and plant promoter substances along with major and micro nutrients necessary for plant growth in water soluble form so that they are immediately available for the plant use. Thus earthworms are natural fertilizer factories.

Vermicomposting is defined as a low cost technology system for processing and treatment of organic wastes (Hand et al., 1988). Considerable work has been carried out on vermicomposting of various organic materials such as animal dung, agricultural waste, forestry wastes, leaf litter and food waste (Hand et al., 1988, Madan et al., 1988, Singh and Sharma, 2002). Certain Epigeic earthworm species such as *Eisenia foetida*, *Perionyx excavates* and *Eudrilus eugeniae* are voracious feeder of organic wastes (Kale and Bano, 1985). *Eudrilus eugeniae* is a native of Africa but it has been breed extensively in the USA, Canada, Europe and Asia and it is commonly called African night crawler. *Eudrilus eugeniae* is a large worm that grows extremely rapid and is reasonably prolific and under optimum conditions it would be ideal for animal feed protein production (Dominguez et al., 2001).

Experiments on life cycle of earthworms have usually been done only with field collected individuals or with laboratory reared ones. Hence some aspects have been poorly tested, such as the existence of putative rearing process in the field and difference between potential and real growth and reproduction. Little is known about the life cycle of one of the most abundant earthworm species *Eudrilus eugeniae* worldwide. This fact hinders the development of appropriate management strategies to optimise its role in maintaining soil properties and in assessing its potential effects on natural and agricultural ecosystem in relation to its possible use in applied studies of ecotoxicology, vermicomposting or ecological restoration.

Materials and Methods

Study site

Kallekulangara is located at 11.70°N, 77.75°E and it has an average elevation of 131m (430ft). The total area is 1155.10 km². Kallekulangara is located about 5km from Palakkad town and it is a small town in Palakkad district of Kerala,

¹PG and Research Department of Zoology, ²Department of Chemistry, Kongunadu Arts and Science College, Coimbatore, TamilNadu, India

*Corresponding author: Email: kathireswari@gmail.com

South India. Emoor Bhagavathi temple plot is the exact study site which is present in Kallekulangara and the average temperature ranges from 25°C to 28°C.

Earthworm collection and preservation

Adult earthworms were collected by digging and hand sorting method (Julka, 1993) from the Kallekulangara region where the elephant dung mixed with soil. The collection was done during the month July 2016, and collected specimens were identified by Dr. P. Kathireswari (one of the author). The presence of earthworm was located based on availability of worm caste on surface soil and colour and humidity of soil. Adult earthworms were sorted and taken into laboratory along with their native soil. Then are washed with distilled water and preserved in 20% formalin solution for identification.

Culture Method

Earthworms collected from different areas were cultured in the laboratory condition as the mother culture, filled with 40 percent soil (from which earthworm was collected), 30 percentage cowdung/elephant dung and 30 percentage leaf litter with proper moisture, aeration and were kept away from sunlight to prevent dehydration. The relative humidity of culture were noted on daily basis and maintained. Dried cowdung and dried elephant dung was mixed with the water was used as feed. Ten clitellate of mature worms were taken and cultured in in-vitro condition and maintained as sub-culture and it was observed for 45 days maintaining with proper feedings. On the 45th day the number of juvenile worms and clitellate worms were counted and noted.

Results and Discussion

The earthworms taken from two areas, Kallekulangara, Palakkad and Kanuvai, Tamilnadu were cultured in laboratory condition and the results were compared. The results revealed that the earthworm collected from the Kallekulangara area can also survive in the Tamilnadu climatic condition and were well adapted and acclimatized. 10 adult worms were introduced in the cow dung and elephant dung respectively and observed after 45th day and compared with the control (Table 1).

The earthworm survey conducted in Kallekulangara, Palakkad, Kerala revealed that the occurrence of four species of earthworm viz., *Eudrilus eugeniae*, *Eisenia fetida*, *Lampito mauritii*, & *Dichogaster bolau*, belonging to four different families.

Earthworm survey in the study area Kallekulangara, Palakkad, Kerala revealed that the occurrence of four different species belonging to four families and four species viz., *Eudrilus eugeniae*, *Eisniae fetida*, *Lampito mauritii*, & *Dichogaster bolau* and it was ecologically categorized into Epigeic, Anecic and Endogeics respectively (Lavellae 1983 and 1997). The comparative studies on reproductive potential of earthworm *Eudrilus eugeniae* in two different culture medium including elephant dung and cow dung shows that, the presence of higher number of juveniles in the elephant dung media than the Cow dung medium. Around 156 juveniles were noticed in elephant dung medium but only 52 juveniles were observed in the culture containing cow dung. The number of clitellate was higher in cow dung medium (49 clitellate), in elephant dung medium it was about 21. The higher reproductive potential in elephant dung may be due to the presence of higher fibre and organic content and also may be because of high micro organisms in the elephant dung.

Table 1. List of earthworm species and its ecological categories

Si No	Family	Species	Ecological Category	Native/Exotic
1	Eudrilidae	<i>Eudrilus eugeniae</i>	Epigeic	Exotic
2	Lumbricidae	<i>Eisenia fetida</i>	Epigeic	Exotic
3	Megascolecidae	<i>Lampito mauritii</i>	Anecic	Native
4	Octochaetidae	<i>Dichogaster bolau</i>	Epigeic	Exotic

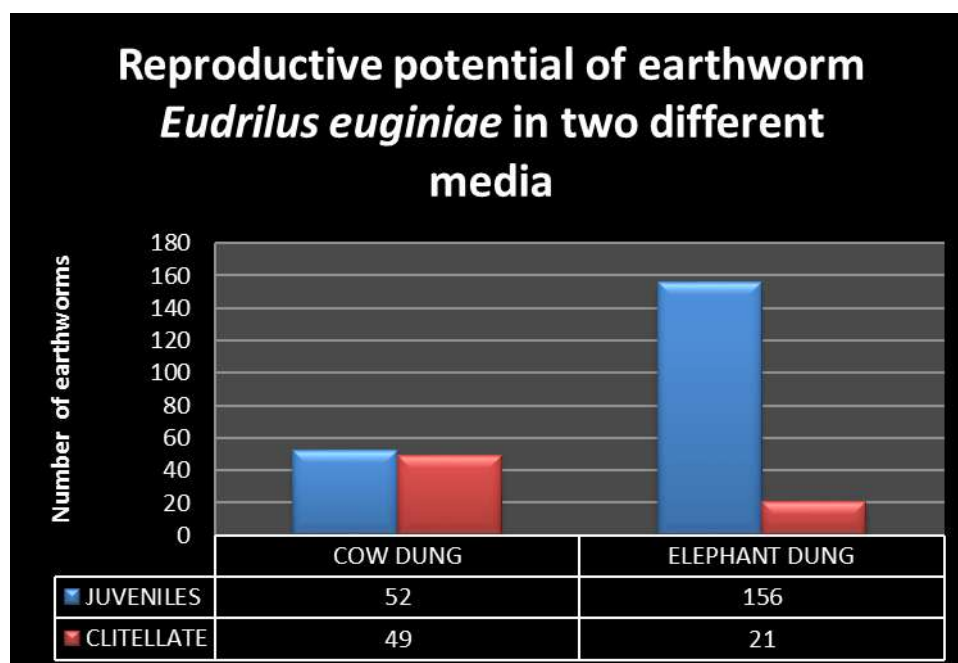


Figure 1. Reproduction rate of *Eudrilus eugeniae* in two different media (Elephant dung and Cow dung).

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