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Impact of different substrates on the mortality of *Eudrilus eugeniae*

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Abstract

Million tonnes of municipal solid wastes are generated per year in India. For the municipal solid waste pollution management vermicomposting is the old but gold method. Vermicomposting is the natural method for degradation of solid waste by earthworm. The *Eudrilus eugeniae* were selected as the experimental animal for the present study. Soil invertebrates play a major role in waste management. Earthworm is an important animal in soil vicinity and it is act as a decomposer system. The current research work, attempts to assess the mortality of *Eudrilus eugeniae* reared in three different substrates.

Keywords: *Eudrilus eugeniae,* Mortality, Manure

Introduction

20 million tonnes of garbage are generated per year in India (Mahdi 1980). For pollution management composting is the best and simple method. Vermicomposting is the easy and natural method of biological degradation by earthworm (Dash and Senapathi 1965). Soil invertebrates play a major role in waste management. Earthworm is an important animal in soil vicinity and it is act as a decomposer system. The current research work, attempts to assess the mortality of *Eudrilus eugeniae* reared in three different substrates.

Materials and Methods

Experimental Animal

The healthy earthworm *Eudrilus eugeniae* were selected as the experimental animal for the present study.

Taxonomic Position

Phylum : Annelida

Class : Oligochaeta

Order : Neooligochaeta
Family : Eudrilidae
Genus : *Eudrilus*
Species : *eugeniae*

Distinguishing Characters

The common name of *Eudrilus eugeniae* is night crawler. *E. eugeniae* species shows faster growth rate and is the second most widely used earthworm for vermicomposting. They are also used for the preparation of vermiprotein. This species is originally distributed in West Africa and is commonly used in South India for vermicomposting process. The live worms are brown and red to dark violet on surface .The length of worm ranges from 32 to 140mm and the diameter is 5 to 8mm. The total number of body segments range from 145 to 196. The worms are sensitive to light. In mature worms, the clitellum contains 5-6 segments. The spermathecal and female pores are fused commencing after 13/14 body segments. The male pores commence before 17/18 body segments. It grows faster and assimilation and conversion of food in to biomass is better than other species and it ranges up to 12mg/day/worm .The maximum body weight of mature individual ranges up to 4.3g/worm. They attain maturity within 40days. Mature individuals produce up to four cocoons /three days depending on appropriate conditions. The total life span of organism in laboratory is 1to3 years. The incubation period of *Eudrilus eugeniae* is 12 days. From each cocoon 1to5 individuals are hatched out. They can tolerate low temperature. The hatching to non-clitellate stage is completed in 40 days. The non-clitellate to clitellate stage is completed in 21 days.

Collection and Maintains of Earthworm

The *Eudrilus eugeniae* were selected for the present study. *E. eugeniae* was bought from S.S farm pandiarajapuram near Vaadipatti, Madurai. The worms were transported to Virudhunagar through boxes with nutrient manure. The worms were kept in the laboratory under room temperature and provided food and maintained as a stock mother culture. The cocoons collected from mother culture were reintroduced into the same bed. The vermibed was kept moist by sprinkling water once in two days.

Experimental Design

Thirty-five rectangular plastic trays (26cm, 12cm, and 5cm) were filled with 100g (DW) of manure like cow manure, goat manure and pig manure. The cow manure, goat manure and pig manure were mixed

(C: G: P) in different proportion like 2:1:1, 1:2:1, 1:1:2 and 1:1:1 in the present experiment. The control tray was filled with either pure cow manure or goat manure or pig manure. The proper moisture was maintained throughout the experiment by sprinkling distilled water whenever necessary. The samples were turned out manually everyday for 15days in order to eliminate volatile toxic gases. After 15 days, 5 non- clitellate earthworms *Eudrilus eugeniae* were introduced into each rectangular tray. The triplicates for control and experimental samples were maintained. All trays with earthworms were kept in dark room. Mortality was recorded weekly for 6 weeks. No additional feed was added at any stage of the experiment.

Result

Table: 1 Mortality of *Eudrilus eugeniae* reared in different substrates. Each value (%) represents an average of three observations.

Substrates	Mortality (%)
Cow Manure (100%)	Nil
Goat Manure (100%)	100
Pig Manure (100%)	100
C:G:P (2:1:1)	Nil
C:G:P (1:2:1)	Nil
C:G:P (1:1:2)	19.6
C:G:P (1:1:1)	19.6

C: G: P - Cow Manure: Goat Manure: Pig Manure

Discussion

In the current research work, earthworm *E. eugeniae* were reared in different substrates like cow, goat and pig manure and mixed manures. In the present research, cow, goat and pig manures were precomposted fifteen days to remove volatile gases before start the experiment. Results obtained show 100% mortality in *E. eugenie* reared in 100% goat manure and in 100% pig manure and a minimum mortality of 19.6 in 1:1:2 and 1:1:1 (C: G: P) manure mixture. No mortality was observed in 100% cow manure and manure mixture of 2:1:1 and 1:2:1. Mortality of earthworm varied in different animal wastes.

Above observations show *E. eugeniae* is sensitive animal in waste recycle. Chang and Griffith 1988 find out that, earthworms fed with untreated pig manure died within a few hours. *E. eugeniae* requires more cow manure in the mixture. Higher the cow manure in the mixture faster will be the growth. Garg

et al 2005 reported the growth and reproduction of *Eisenia foetida* in various animal wastes. Jorge Dominguez *et al* 1999 analyze the effect of bulking materials on the growth and reproduction of earthworm *Eisenia andrei* using sewage sludge. Shagotium *et al* 2004 suggested the effect of temperature on reproduction of the epigeic earthworm *Eudrilus eugeniae*.

Loh *et al* 2005 studied the reproduction potential of *Eisenia fetida* under the cattle and goat manures. They concluded that cattle manure provided a more nutritious and friendly environment to the earthworms than goat manure. Biradar 2003 reported the influence of organic wastes and seasonal environmental factors on reproduction of *Eisenia fetida*.

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