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Zoology

VARIATION OF EARTHWORM BIOMASS AT 60°C

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ABSTRACT The earthworms, *Eudrilus eugeniae* were collected and acclimatized in laboratory condition prior to different research work. Then they were prepared for biomass test for which they were exposed to 60° C for 5 hour and then next 5 hour for comparison. In other words, biomass of *Eudriluseugeniae* was highest at 0hour(control)and gradually the biomass decreases after 5 hour and 10 hours. Maximum decrease in biomass was noticed at 10 hour.Soil sample were collected from the vermiculture bed for soil bioassay. Here we observed that the pH of the soil was neutral, Oxidizable Organic Carbon (OC) was low, Phosphate (P_2O_5)was absent in the vermiculture bed. Quantity of available Potassium, Ammoniacal Nitrogen and nitrogen were low but Nitrate Nitrogen was high about 50 Kg/ha as (N) in soil.

KEYWORDS : Bodyweight, 60°C, soil bioassay, Eudriluseugeniae

INTRODUCTION

Earthworms are involved in a large number of ecosystem functions and services, such as decomposition (Milcu*et al.,*2008), nutrient cycling(Blouin et al., 2013) and climate regulation (Zhang *et al.,* 2013), amongst others(Blouin *et al.,* 2013). In addition, they are often used as bioindicators of soil biodiversity and health (Paoletti, 1999). Earthworms are relatively easy to sample; thus, a large amount of data are available (Phillips, 2019). Nevertheless, previous attempts to collate earthworm datasets have been geographically restricted (Rutger *et al.,* 2016; Burkhadi*et al.,* 2018).

In soil, earthworms represent the largest component of animal biomass and are commonly termed ecosystem engineers (Blouin *et al.,* 2013). Earthworm biomass is an appropriate biological indicator of soil fertility, humus quality, degradation, pollution and habitat productivity. Earthworms constitute the highest biomass within the soil macrofauna (Fragoso and Lavelle 1992) and they are known to affect the soil physical, chemical and biological properties. Earthworm biomass is a suitable indicator to determine soil pH, soil moisture and organic layer (Muys andGranval 1997), and it seems that tree species have different effects on earthworm biomass and abundance. In broad leaved forests the presence of earthworms could be dependent on litter and soil characteristics (Irannejad and Rahmani 2009). Earthworms form the largest part of the invertebrate biomass in most temperate soils(Paoletti, 1999).

Earthworms are an important food source for many species (below andabove the ground) (Lee, 1985) and by their burrowing activity change the physical status of biotic and abiotic substrates, (Jones *et al.*, 1994; Anderson, 1995). *Eudriluseugeniae*is a large worm that grows extremely rapidly and is reasonably prolific and under optimum conditions it would be ideal for animal feed protein production; however there has been relatively little work on the biology and ecology of this species (Neuhauser *et al*., 1979)

In this present work we did a small survey regarding which the research was able to observe the differenceof weight between control and dried earthworm and also analyse the status of soil in vermicompost were measured and compared.

MATERIALSAND METHOD

The earthworm, *Eudrilus eugeniae* were purchased from soil conservation office, Markona, Balasore and were acclimatized for seven days in the laboratory condition prior to the experiment. The earthworm, were cultured in the laboratory around the year and earthworms are collected randomlyfrom the culture out of which 6 numbers were picked up and were prepared for experiment. The soil from that vermicompost were also collected prior for testing.

METHOD

All the earthworms were counted and then they were oven dried at 60°C for 24 h. All the dried earthworms were weighed to the nearest 0.0001 g to determine their biomass by Welke and Parkinson, 2003.The testing of the soil was performed by the soil testing kit.

RESULT AND DISCUSSION

Biomass

Biomass (g) of *Eudrilus eugeniae* at60° C temperaturewere0.791667 ± 0.182612 g at 0 hour (control), 0.225 ± 0.083217 g after 5 hour and 0.191667 ± 0.045977g after 10 hour (fig-1). In other words, biomass of *Eudrilus eugeniae* was highest at 0 hour (control) and gradually the biomass decreases after 5 hour and 10 hours Maximum decrease in biomasswas noticed at 10 hour.The change in biomass over the course of the experiment is shown in figure. An initialrise was followed by a long, slow decline over the summer months. This was due to aninitial error of the bedding used was due to aged manure. This results in drying out, so that the worms' habitat was not ideal. In late summer, more manure was then added to the top. The increase in biomass that resulted from that action can be seen in the spike in late October. The overall biomass increases from start-up to May, 2021. There was a 14-fold increase over the 10 months, from an initial stock of 250 g to the May estimate of 1 kg. The lack of a winter kill-off was probablydue to the large amount of veryfresh manure added to the pile prior to covering it with the insulating straw.One way ANOVA revealed that the biomass is significant. [F (2, 17) = 40.239, (P=0.00)]It was found that, the biomass in *E. eugeniae* in control and in those after 5 hours and 10 hours showed significant differences.Post Hoc analysis revealed that the biomass at 5 hour and 10 hour is significant 05; LSD) with respect to control.

Soil Test Result Of Soil Sample Used For Soil Bioassay

On the basis of the soil test results, the pH of the soil sample used for soil bioassay was 7.0 i.e., neutral [Table-1]. Percentage (%) of Oxidizable Organic Carbon (OC) was in between the range 0.407-0.500 i.e., low in soil. Amount of available Phosphate in soil Kg. per hectare as (P_2O_5)was nil i.e., absent in the vermiculture bed.Quantity ofavailable Potassium in soil Kg. per hectare was low, below 112 Kg/ha as (K_2O) because all the three lines are visible. The quantity of Ammoniacal Nitrogen and Nitrate Nitrogen of the soil will change very quickly. If the Organic Carbon was low then the supply of nitrogen to the soil was also low. The value of Ammoniacal Nitrogen was low about 15 Kg/ha as (N) and that of Nitrate Nitrogen was high about 50 Kg/ha as (N) in soil.

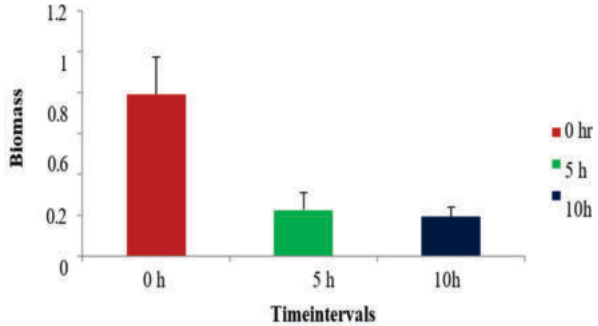

Fig.1: Comparisonofbiomassat60°Ctemperaturein*Eudriluseugeniae*at different time intervals

Table-1: Physio-chemical Properties Of The Soil Sample That Is Used In Soil Bioassay

Serial No.	Parameter	Soil sample
1	pH	7.0 (Neutral)
2	% of Oxidizable Organic Carbon (OC)	0.407-0.500 (Low)
3	Available Phosphate (P_2O_5) Kg ha^{-1}	Blank (Nil)
4	Available Potassium (K_2O) Kg ha^{-1}	Below 112 (Low)
5	Ammoniacal Nitrogen Kg ha^{-1}	About 15 (Low)
6	Nitrate Nitrogen Kg ha^{-1}	About 50 (High)

DISCUSSION

Biomass changes can be a good indicator of chemical stress, which may link chemical effects to energy dynamics and ultimately inhibit growth. A dose dependent decrease was observed in the growth of *Eisenia fetida*exposed to dieldrin at several sublethal concentrations (Reinecke *et al.,* 1985).A significant growth inhibition on earthworm *Lumbricusrubellus* was also seen when exposed to PAH pyrene (Brown *et al*., 2004). Augusto and Ranger (2002) and Binkley and Sollins (1995) stated that the soil physical properties such as texture, density, porosity and structure are almost related to variations of site conditions. Fakharirad (2005) also stated that in even-aged alder and loblolly pine stands, the differences in soil physical properties were very small and soil chemical properties often showed significant changes. The results of this research was significant differences in biomass comparisonand in physico-chemical properties did not show any significant difference as the $P^H$of soil was neutralamong poplar species and clones (the treatments).

CONCLUSION

The conclusions of the investigations were that *Eudrilus eugeniae* is a fast-growing and productive earthworm in animal waste i.e., ideally suited as a source of animal feed protein as well as for rapid organic waste conversion. It is more productive in terms of rates of growth than other species and would seem to be a suitable candidate for vermicomposting systems, in regions where the optimal temperature of 25°C is both feasible and economic. The large size of *E. eugeniae* makes it much easier to handle and harvest, than the other.

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