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The Performance of *E. Eugeniae* and *E. Fetida*, in Generating Vermicasts Fed with *Salvinia* in Pre-Pilot-Scale System

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ABSTRACT

The study on vermicomposting of salvinia at pre-pilot scale using two earthworm species and three different forms of salvinia was reported. In this work, the performance of the reactor operated in lab-scale system in vermicomposting of salvinia is presented. The potential of two epigeic species (*Eudrilus eugeniae*, Kinberg and *Eisenia fetida*, Savigny) of earthworms was assessed in terms of efficiency and sustainability. Each species were separately tested. In both reactors earthworms were healthy and produced vermicast. The study also indicates that *E. eugeniae* performed 1.3 times better than *E. fetida*, in terms of vermicast output. Since there was no mortality, the reactors can be operated indefinitely on this feed.

Keywords: Disposal, Extraction, Pollution, vermicomposting.

INTRODUCTION

The study was made to study the performance and sustainability of *E. eugeniae* and *E. fetida* in vermicomposting of salvinia at pre-pilot scale without any addition of animal dung or pre-composting is reported (3). The efficiency of the reactors was assessed in terms of vermicast production, worm growth and fecundity.

MATERIALS AND METHODS

Eudrilus eugeniae and *Eisenia fetida* were used for the study. Rectangular, 51 L Aluminium trays (157×65×5cm) were used as vermireactors. The

reactors were lined with HDPE sheet to prevent the corrosion of the material. Double layer of moist jute cloth of 5mm thickness were placed at the bottom of each reactor and the fresh feed 750 g (dry wt.) was laid over it. In each reactor, 50 healthy, adult animals of chosen species were introduced. These animals were picked from the cultures maintained by the authors with cowdung as the feed. Each culture had more than 1000 animals from which 50 individuals were randomly picked for these experiments, which were operated for a month. The average moisture content of the vermireactors was maintained at $75 \pm 1\%$ by monitoring the moisture content of the reactors every week and sprinkling the required quantities of water (1; 3). All

quantities were adjusted so that the feed and the casting mass reported represent dry weights (taken after oven-drying at 105°C to constant weight). The earthworm biomass are reported as live weight, taken after rinsing adhering material off the worms and blotting them dry. The castings were carefully sieved to separate other particles. A portion of the castings was then weighed and thoroughly washed with water to separate the small soil particles contained in the castings from the organic matter. The separated soil was oven dried (105°C) to constant weight. This enabled determination of the mass fraction of soil particles contained in the castings. This fraction was subtracted from the total mass of castings recovered. Thus, the vermicomposting data presented here pertain to conversion of only the feed to the castings, and exclude the entrained soil (1; 2; 3).

RESULTS AND DISCUSSION

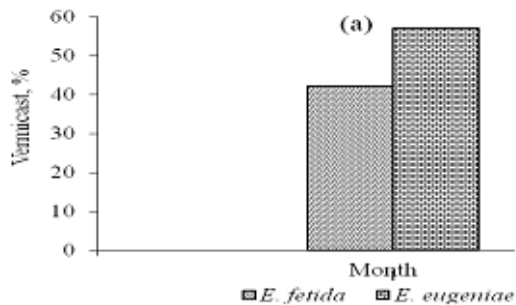


Figure 1. Vermicomposting of aquatic weed salvinia in vermireactors operated with *Eisenia fetida* and *Eudrilus eugeniae*: (a) Percent conversion into vermicast

From the beginning of the experiment, it was very keenly observed that, there was no mortality or ill effects of earthworm with this feed for one month of duration. These experiments have shown that the aquatic weed salvinia is softer and hence palatable to the worms.

The inoculated worms took some time (4–5 days) to acclimate with the changeover to salvinia feed. After the worms get adapted to the given feed, the vermicast was observed from the periphery of the reactor.

In the subsequent days, both species of earthworms were feeding actively and have been deposited the vermicast on the surface of the reactor. The cocoons and juveniles were observed in between the substrate. Both species of earthworm performed well and produced more vermicast in short period (Fig. a), albeit, *E. eugeniae* produced more vermicast (57.6) than *E. fetida* (42%).

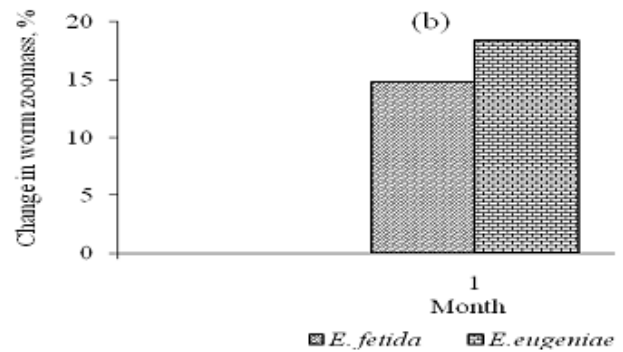


Figure 2. Vermicomposting of aquatic weed salvinia in vermireactors operated with *Eisenia fetida* and *Eudrilus eugeniae*: (b) gain in earthworm zoomass.

The maximum average positive worm zoomass gained was recorded in reactors operated with *E. eugeniae* (12.9%) and minimum zoomass with *E. fetida* (10.2%).

Both species of earthworms reproduced in reactors and produced the offspring (Figure.3 c) but *E. eugeniae* performed 1.2 times better than *E. fetida*. There was no mortality in any of the vermireactors. As the study was conducted only for a month, the performances of the reactors were not compared statistically.

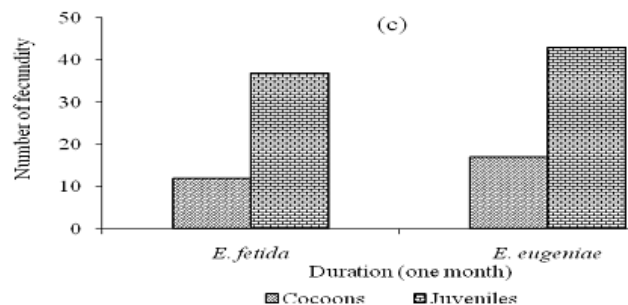


Figure 3. Vermicomposting of aquatic weed salvinia in vermireactors operated with *Eisenia fetida* and *Eudrilus eugeniae*: (c) generation of fecundity.

CONCLUSION

Whole plants of salvinia (*S. molesta*) was tested as substrate for vermicomposting - without pre-composting or any other form of elaborate pretreatment and addition of cowdung. With it vermireactors operated with two common earthworm species *E. fetida* and *E. eugeniae* to assess the comparison of efficiency of conversion of the feed to vermicast.

The results indicate that, both species performed well in reactor fed with salvinia as feed, but the overall output was led by *E. eugeniae* and followed by *E. fetida*

in terms of vermicast production, the average mass of earthworm and fecundity. There was no mortality or negative change in worm zoomass with any species. Hence, these observations confirmed that salvinia is sustainably utilizable by the epigeic earthworms for the production of vermicast.

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