St. Joseph's Journal of Humanities and Science
ISSN: 2347 - 5331
http://sjctnc.edu.in/6107-2/

Production of Vermicast from the Noxious Invasive Lantana (Lantana Camara)

- T. Ganeshkumar*

Abstract

The vermicomposting of noxious terrestrial weeds lantana (Lantana camara) with the epigeic earthworm species Eudrilus eugeniae, Eisenia fetida, and Perionyx excavatus is reported. In forty days of experiments, the results revealed that once in ten days, there was little increase in vermicast output in reactors operated with E. eugeniae without any mortality. But there was significant earthworm mortality and loss of weight of the earthworms in Eisenia fetida and Perionyx excavatus. A careful investigation of the possible causes revealed that, water oozing out from the substrate make the mass to compress with each other and become a single layer, blocking air entering the reactors. This may be the reason for the high rate of mortality and weight loss in earthworms forced to feed upon lantana in the experiments. Thus, this part of the experiments was not conducted further.

Key words: disposal, extraction, pollution, vermicomposting.

INTRODUCTION

Lantana camara (*L. Verbanaceae*) a noxious weed grows under varying conditions of climate and soil. The dry forests of southern India have been attacked by a few fascinating plants of which lantana emerge due to its fast spread, power of infestation, and relentless imperviousness to cutting and smouldering [1-10] Lantana is a local of tropical America, and was acquainted with India to be planted in greenery enclosures and supports. Since then, the species has spread rapidly into both farm and forest lands, and is a standout amongst the most across the board, physical obtrusive species in India today. Lantana debilitates common environments and local widely varied vegetation [10, 11]. It swarms fields, grazing terrains, plantations and products like, tea, oil palm, coconut and cotton, and decreases the financial reasonability of the yields. The allelopathic characteristics of lantana lessen the force of local plant species and point of confinement their profitability [3]. Lantana infestations can once in a while be persistent to the point that they can totally slow down the recovery of woods for quite a long while. The immediate fuse of their green matter in soil causes poor germination of seed and lessening in harvest yields [4, 12]. Be that as it may, the reusing of these weeds as composted manure is the best way to evade their aggravation, contamination impact and prompting their ideal utilization. It is usually

*Department of Zoology, St. Joseph's College of Arts and Science (Autonomous), Cuddalore, Tamil Nadu, India.
E-mail ID: ganeshkumarphd@gmail.com
Mobile No.: +91 8903683394

controlled by physical routines, for example, cutting, evacuating and smouldering. Herbicides have likewise been utilized yet not on extensive scale because of restrictive expenses. Nevertheless, the reusing of these weeds as treated the dirt waste products is the most ideal approach to keep up a vital separation from their irritation, sullying effect and inciting their optimal use [2].

In recent years Gajalakshmi and associates presented the idea of direct and proficient vermicomposting of phytomass. It has been inspected as of late the utilization of phytomass as a substrate for generating vermicompost had been extremely constrained. Before the presentation, there is no method had existed on vermicomposting of phytomass which had the potential for extensive scale usage [8].

Vermicomposting is one of the rapid and effective approaches to reusing organic debris into vermicompost. Vermicompost is a profitable soil change, which replaces the compound manures, fortifies plant development and forestalls plant illnesses, other than expanding the nature of the produce [5]. It supplies the fundamental components to soil as well as enhances the physicochemical and natural properties of the dirt. Vermicompost manage the yield without falling apart soil wellbeing. Earthworms are the proficient buyers of the natural waste and offer a sparing and reasonable mean of waste transfer. Because of the raising costs of substance composts and diminished accessibility of natural fertilizers, there is a critical need to use this natural debris as useful fertilizer [1].The present studies on the screening and sustainability of using three species of epigeic earthworm in generating vermicasts from lantana.

MATERIALS AND METHODS

The epigeic earthworm species *Eudrilus eugeniae*, *Eisenia fetida*, and *Perionyx excavatus* were used for the study because of its voracious appetite high rate of growth, and reproductive ability [6]. The authors have reported vermicomposting of several leaf litters of terrestrial and aquatic weeds [7, 8] with these phytophagous species. Circular plastic containers (volume 5 l) were used as vermireactors. Double layer of moist jute cloth was used as vermibed and 300 g of substrate (dry weight) was placed on it. In each reactor, 10 healthy, adult individuals of earthworms were introduced. All the reactors were maintained in an identical environment with respect to temperature and moisture.

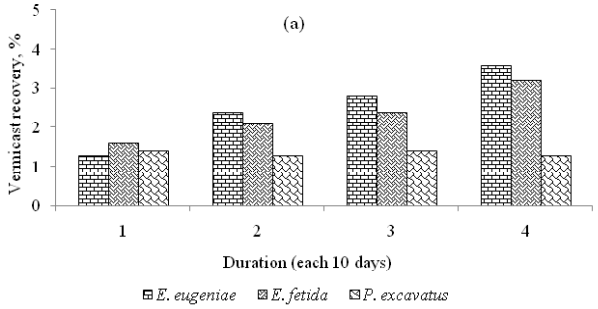
In each run, the castings and the earthworms were removed from the reactors on the 10th day. They were placed in separate containers for quantification. Within few minutes fresh reactors were started with remaining feed. The juveniles, if any generated in the previous run, were separated and the 10 worms, with which the reactors had been started, were weighed and reintroduced.

During the course of the experiments, the reactors were kept under the same ambient conditions of 30°C ± 4°C temperature and 60% ± 10% relative humidity. Their water content was maintained in the range 60% to 70%. All quantities were adjusted so that the feed and the casting mass reported in this paper represent dry weights (taken after oven-drying at 105°C to constant weight). The earthworm biomass is reported as live weight, taken after rinsing adhering material of the worms and blotting them dry. The castings were sieved through a 3-mm mesh to separate other particles. It also ensured that the unutilized feed did not accumulate, and possibly biodegrade, in the reactors [9].

RESULTS AND DISCUSSION

The average vermicast recovery as the fraction of feed mass is presented in Figure 1. The performance of all the vermireactors in terms of production of casting has improved but very slowly.

In the first two fortnights the vermicast output was low, indicating a gestation period. The earthworms used in the present experiments were picked from the culture maintained with cowdung as feed. The gestation period implies that they took some time to get acclimatized to the new feed [6].



Fig, 1: Vermicomposting of terrestrial weed lantana in reactors operated with E. fetida and E. eugeniae and P. excavatus.

Subsequently, there was slow increase in vermicast output in all the reactors albeit, *E. eugeniae* (3.6%) performed a step better than *E. fetida* (3.2%), and *P. excavates* (1.3%), but the difference was not statistically significant. There was little positive change in zoomass in reactor with *E. eugeniae*.

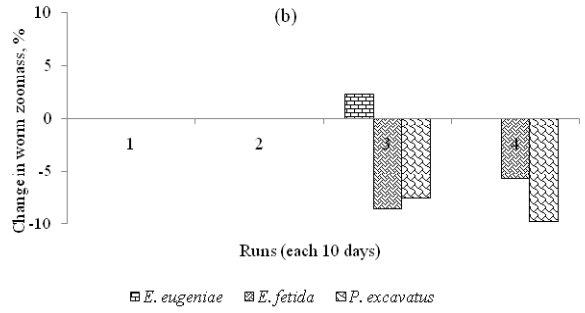


Fig. 2: Change in worm zoomass in reactor operated with Lantana camara as feed with the earthworm species E. fetida and E. eugeniae and P. excavatus.

There were mortality with both *E. fetida* (-8.3, and -5.8%) and *P. excavatus* reactors (-9.7, and -10%). But *E. eugeniae*, proved to sustain and there was neither mortality nor negative change in zoomass.

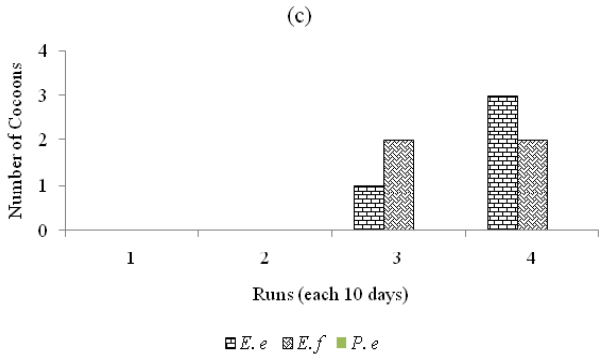


Fig. 3: Cocoons produced in vermireactors operated with E. eugeniae and E. fetida

Cocoons were observed after two runs. But, due to the oozeout of water from feed, the substrate stuck with each other and become a single layer, blocking air entering the reactors.

The results also indicate that the reactors are operated in a normal pulse-fed fashion, wherein some earthworm degraded the feed slightly and most of them couldn't enter into the substrate and were trying to escape. Indeed, the rate of vermicast production can be increased further by employing a larger number of *E. eugeniae*. Since it is the only earthworm survived without any mortality. Further, studies may be continued with *E. eugeniae*.

CONCLUSION

Whole plants of the terrestrial weed lantana (*L. camara*) were directly vermicomposted - without precomposting or any other form of elaborate pre-treatment and without any fortification with animal manure. With it, vermireactors were operated, separately, with three common earthworm species *E. fetida* or *E. eugeniae* and *P. excavatus* for 40 days. The results indicate that due to oozing out of water from lantana, the substrate stuck with each other forming a single layer sheet, thus blocking air entering the reactors. Of the three species of earthworms tested and observed by us–*E. fetida,* and *P. excavatus* were not tolerant and could not continue to survive, *E. eugeniae* was more tolerant and produced vermicast. Thus, a further study was conducted to assess the suitable form of lantana for vermicomposting with *E. eugeniae*.

ACKNOWLEDGEMENT

Authors grateful to University Grand Commission for Rajiv Gandhi National Fellowship.

REFERENCES

1. T. Abbasi, S. Gajalakshmi, S.A. Abbasi. Indian Journal of Biotechnology, 2009.
2. S.A. Abbasi, N.M. Shah, and T. Abbasi, Journal of Cleaner Production. DOI: 10.1016/j.jclepro.2015.
3. R. Ahmed, M.B. Uddin, M.A. Khan, S.A. Mukul, M.K. Hossain. Journal of Forestry Research, Volume 18, Issue 4, pp 301-304, 2007.
4. E.T. El-Kenany, S.M. El-Darier. Journal of Taibah University for Science, Volume 7, Issue 2, PP, 64–71, 2013.
5. S. Gajalakshmi, P.S. Ganesh and S.A. Abbasi. BiochemEng J (Elsevier) 22:111–116, 2005.
6. S. Gajalakshmi, E.V. Ramasamy and S.A. Abbasi. BiorescourTechnol (Elsevier) 82:165–169, 2002.
7. P.S. Ganesh, S.Gajalakshmiand, S.A. Abbasi. BioresourTechnol (Elsevier) 100:1819–1827, 2009.
8. T. Ganeshkumar, M. Premalatha, S.A. Gajalakshmi, Bioresources and Bioprocessing, 1:26, 2014.
9. S.G.A. Godson, S. Gajalakshmi, S.A. Abbasi. International Journal of Environmental Science and Engineering Research (IJESER), Vol 6(1):1-6, 2015.
10. N. Priyanka and P.K. Joshi. International Journal of Scientific and Research Publications, Volume 3, Issue 10, ISSN 2250-3153, 2013.
11. G. Ramaswami and R. Sukumar. Journal of Biosciences, Volume 39, Issue 4, pp 717-726, 2014.
12. G.V. Smith and D. Panetta. Invasive Plant Science and Management ,doi: http://dx.doi.org/10.1614/IPSM-08-130.1, 2009.