

The Effect of Different Feed Material Mixtures on the Development and Growth of Earthworm *Eutyphoeus Waltoni*

***Dr. Rana Taj**

Abstract

The growth and development of an earthworm, *Eutyphoeus waltoni*, were examined in a laboratory setting using the same animal agricultural and food wastes. When buffalo dung, agricultural waste, and kitchen garbage were combined, earthworms showed substantial growth and development. Earthworms were found in the greatest amount in buffalo dung that also included gram bran. Gram bran with cow manure showed the most meaningful increase. While the combination of gram bran and buffalo dung led to the most discernible increase in weight and length. As a result, when coupled with gram bran, buffalo dung was very effective in promoting the growth and development of the earthworm *Eutyphoeus waltoni*.

Keywords: *Eutyphoeus waltoni*, Wastes, Animal Dung, Development

Introduction

The soil becomes infertile and less productive when chemical fertilisers are used excessively. Due to increasing production of food grains to feed the people, there are now more organic agricultural wastes being produced than ever before, which is creating disposal issues. India generates about 3000 MT (million tons) of organic waste annually, and according to conservative estimates, there are about 600-700 MT of agricultural wastes (including 272 MT of crop residues) there each year. However, the majority of this waste is not used for sustainable practices. In India, millions of tons of livestock dung are generated each year at the rates of 12.20 kg of buffalo dung per day, 11.6 kg of cow dung per day, and 0.70 kg of goat dung per day. Due to their vast worldwide distribution, earthworms, one of the main macro invertebrate species in soil, are well recognised for their contributions to soil formation and turnover. One of the most crucial instruments in the effort to recycle agricultural waste into biofertilizers is vermicomposting. The US Geological Survey discovered a substantial correlation between rising animal densities and rising in-stream loads of nitrogen and phosphorus. Earthworms may consume organic waste, turning it into a substance resembling peat known as vermicompost.

Different mixtures of animal dung (including cow, sheep, horse, goat, and buffalo) along with agricultural wastes (such as vegetable waste, wheat bran, rice bran, gram bran, barley bran, and

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straw) have been utilized as an effective method for long-term microcomposting. The inclusion of vermicompost enhances soil fertility by altering the substance's chemistry and physical makeup. Various factors, including the type of waste, temperature, density, moisture, chemical composition, presence of bulky materials, and the species of earthworms involved in the development and reproduction of earthworms are substantially influenced by the vermicomposting process. The ability of different earthworm species to reproduce and grow in a variety of substrates can serve as helpful biomarkers to gauge how effective a particular earthworm species is at vermicomposting or earthworm-based biotechnology, as enormous amounts of waste can be managed through their widespread population. An endangered species of earthworm found across India is called *Eutyphoeus waltoni*. The agricultural areas of eastern Uttar Pradesh are abundant with *Eutyphoeus waltoni*, and a substantial population is required to improve waste recycling in agricultural fields¹⁰. More calf waste than goat dung contributed to *Eisenia fetida*'s biomass increase and cocoon formation. Earthworms seem to be a tool with the ability to solve or lessen feed costs and waste disposal issues by converting harmful wastes into useful minerals. The purpose of the current research was to examine how *Eutyphoeus Waltoni* grew and developed in various combinations of animal, agricultural, and kitchen wastes.

Materials and methods

Collection and Culturing of the Earthworm:

The Earthworms are collected from Government P G College Kaladera, Jaipur randomly, *Eutyphoeus waltoni*, from among six stockcultures kept there.

Waste Collection from Cattle:

Fresh animal excrement, mostly buffalo faeces, was gathered from farms in Gorakhpur city. The animal manure was utilised ten days after it was collected since pre-composting is crucial to preventing worm death.

Gathering of Food and Garden Waste:

The organic wastes (agro and kitchen) that were employed as substrate were gathered from the trash and several villages in the Gorakhpur area. For biological and visual examination, The materials were kept at a constant room temperature.

Design of the Experiment:

On the floor's cement surface, measurements of *Eutyphoeus waltoni*'s gross weight (length, weight, and number) were made. 2 kilograms of the mixture (ratio 1:1) was placed on cold, raised floor surfaces measuring 30 cm 30 cm 10 cm. Animal dung was used as the standard. For ten days, the combinations are manually turned over once every n hours in order to get rid of the volatile compounds. Throughout the trial period, the moisture content was maintained between 40 and 60 percent. The total number of earthworms, together with their length and weight, were counted from

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each bed after 60 days. Six times each experiment was duplicated.

Statistical Analysis:

The data were reported as the mean SE of six replicates. The Student's t-test was used to assess the significant ($P < 0.05$) differences between various types of cow dung and various combinations of cow dung with agricultural and kitchen wastes.

Result and discussion

Table: The growth and development of the earthworm *Eutyphoeus waltoni* are affected by the use of animal manure and its mixing with agricultural and household waste.

Wastes	Number	Weight	Length
Buffalo Dung	67.00±0.89	748.02±32.43	6.28±0.7
Dung +Gram Bran	107.00±0.77*	1132.45±33.03*	9.68±0.21*
Dung + Straw	99.76±0.81*	963.31±38.40*	8.92±0.61
Dung + Wheat Bran	91.94±0.75*	924.51±38.52*	8.12±0.23
Dung + Rice Bran	82.01±0.62*	783.80±27.00*	7.50±0.02
Dung+ Vegetable Wastes	68.02±0.02	729.90±36.99	7.92±0.23
Dung + Barley Bran	106.98±0.59*	1048.38±31.06*	9.12±0.32

Cattle manure, agricultural waste, and kitchen trash all combined to significantly increase the population of *Eutyphoeus waltoni*. In comparison to cow dung alone, there was a significant increase in the quantity, weight, and length of earthworms when buffalo dung and agricultural/kitchen wastes were combined. The *Eutyphoeus waltoni* inoculated on a bed of buffalo dung with gram bran showed an average weight growth of 1132.25 mg/animal and a length of 67 cm/animal. After 60 days of inoculation, the bed of buffalo dung + gram bran (107) showed the highest growth in earthworm population when compared to the initial 20 injected earthworms. However, it was discovered that there were 67.000.89 earthworms in the faeces of buffalo. Two methods The varied combinations of buffalo dung and agricultural/kitchen waste were compared using ANOVA, which revealed a significant difference in the quantity and weight of the column for each combination.

The different binary combinations of rice bran, wheat straw, barley bran, gram bran, and banana peels with buffalo dung resulted in significant increases in the number of cocoons, clitellum development, initiation of cocoon production, and weight gain in *E. fetida*. Because buffalo dung is quite strong, we employed it in our experiment together with a mix of agricultural and household wastes to look at the growth and development of the earthworm *Eutyphoeus waltoni*. In comparison to the original feed combinations, the final vermicompost had different physical and chemical properties. The low nitrogen residue in agricultural wastes is a consequence of soil bacteria immobilising inorganic nitrogen, rendering it inaccessible to plants. Earthworms play a significant role in preventing the emission of greenhouse gases from soils all over the globe, and their effect is

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anticipated to grow over the next several decades. The kind of food seems to be the most crucial of the several factors required for earthworm production. Fresh beef, pork, fruit, and vegetable wastes did not support the existence of worms. Depending on the calibre of the worm feed, various combinations produced distinct patterns of earthworm production. *E. fetida*'s rate of weight increase is dependent on both food type and population density¹⁴. In fact, one kilograms of adult earthworms may convert up to five kilograms of garbage every day, and around ten kilograms of adults can convert one tons of waste per month. For comparing the development of earthworms in various wastes, growth rate is a useful indicator. Gram bran and buffalo dung are both significant sources of organic nutrients. Feeds that supply appropriate amounts of quickly metabolizable organic matter and non-assimilated carbohydrates to earthworms promote their growth and reproduction⁴. Therefore, the combining of agricultural and domestic wastes with animal dungs gave us a considerable outcome. In the buffalo inoculated with gram bran, an average weight increase of 1132.4533.03mg/animal and length of 9.68cm/animal were recorded. The composition of the diet plays a vital role in the timeframe required for earthworms to reach sexual maturity and initiate reproduction. The combination of buffalo dung and gram bran results in the most significant increase and breakdown of earthworm populations due to their favorable biochemical characteristics.

Eutyphoeus waltoni exhibits great growth and development when agricultural and kitchen waste are combined with buffalo dung, according to the observation. The environment for *Eutyphoeus waltoni*'s improved growth and development is provided by the mixture of agricultural and kitchen wastes with buffalo dung. When fed on buffalo dung mixed with gram bran, *Eutyphoeus waltoni* grew and reproduced at their fastest rates. Therefore, gram bran and buffalo dung are a good combination for the earthworm *Eutyphoeus waltoni*'s growth and development.

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