

## Nutritional Evaluation of Earthworm Powder (*Lampito mauritii*)

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### ABSTRACT

Dried earthworm powder from culture of *Lampito mauritii* in vermicomposting units and subjected to analysis of protein, carbohydrate and mineral content. The EWP contained large amounts of protein (31.7 %), iron (241.1ppm), soluble nitrogen (1.8%), zinc (32.34ppm), manganese (17.2ppm) and copper (4.501ppm) together with notable quantities of potassium, calcium, magnesium, phosphorus and carbohydrate indicating that this type of earthworm contain potentially useful quantities of many nutrients, that are important to the human health.

### INTRODUCTION

Animal protein in the feeds of animal and in the food of human being is essential for growth and health respectively. Earthworm meal (vermin meal) is as good as fish meal in terms of quality and has been found to be an efficient substitute for fish meal in domestic animal diets.

The potential value of earthworm as a protein source has been established by several authors. Guererro (1981) working on *Perionyx excavatus* found that the worm is a good source of protein. Similarly Staford and Tacon (1984) expressed that *Dendrodrilus subrubicundus* contains 65 per cent crude protein. Edwards and Niederer (1988); Vielma-Rondon (2003) revealed that earthworms are an excellent and rich source of (>60% w/w) protein. While Sabine (1983) said that on an average, earthworms have 60-70% crude protein (dry weight). Furthermore, studies had shown that not only earthworms serve as a rich protein source but also form the sources of essential amino acids, especially lysine which exists in many basic foodstuffs.

The content of lysine in earthworm flour is significant for the daily consumption of children between 2 and 5 years of age. On line with this backdrop and to face the high cost of animal the meal due to increasing demand for high quality protein in intensive animal feed industries along with ethical issues, earthworm could fit into this mold. Therefore, the drive of worldwide animal farmers is to source for cheaper means of nutritive dietary supplement which may replace fishmeal (wholly or partly) in animal diet and also to supply micro and macro-nutrients. Taking into consideration, the value of different species of earthworm as supplement in animal dietary formulation had been rated high. It therefore becomes necessary to establish the nutritional profile of earthworm commonly found in South East TamilNadu. Thus the present study focuses on the determination of the nutritional value of EWP obtained from *Lampito mauritii*.

### MATERIALS AND METHODS

Earth worms were collected between August to October since earthworms in the adult stage were available only during this period. Digging and hand sorting method was used to gather the worms.

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### Extraction and preparation of the sample

Approximately 500 cultured earthworm, (*Lampito mauritii*) were collected and washed in running water to remove dirt from the body surface. The earthworms were soaked in running tap water to remove dirt from the body surface. The earthworms were soaked in distilled water for 5 hours to allow the soil in its tract to be excreted. Then earthworms were washed thoroughly with distilled water and placed in a Petri dish, which was then kept in an incubator for 24 hours at 55°C. After 24 hours the earthworms were removed and pounded to make it into powder. The powder was stored in a refrigerator at normal temperature (Yegnanarayan *et al.*, 1987).

### Nutrient Analysis

Sulphuric acid and Nitric acid digestion method was used for the estimation of various mineral nutrients in the earthworm powder. The minerals content tested includes Magnesium (Mg) Calcium (Ca) Iron (Fe) Manganese (Mn) Zinc (Zn) Copper (Cu) Phosphorus (P).

The earthworm powder was also subjected to the analysis of nitrogen and potassium using standard procedures (Homer, 2003). The carbohydrate (Hedge *et al.*, 1962) and crude protein (Lowry *et al.*, 1951) in Earthworm Powder (EWP) of *Lampito mauritii* were also estimated.

### Statistical Analysis

The results obtained in the study were statistically analyzed and the data were expressed in mean  $\pm$  S.D from replicate (ten) determination.

## RESULTS AND DISCUSSION

The present study was successfully completed with the collection and culture of the earthworm species *Lampito mauritii*, and then the converted powdered form was subjected to biochemical analysis. The nutritional status of the dried powder of *Lampito* was elucidated in Table.1. Previous studies showed that the earthworm meal of *Lumbricus* had 65.63% crude protein content (Damayanti *et al.*, 2008), earthworm meal of *Lumbricus terrestris* contain 32.60% protein (Julendra, 2003), earthworm meal of *Perionyx excavatus* contain 57.2% crude protein (Tram *et al.*, 2005) and earthworm powder of *Eudrilus eugeniae* contain 5.21mg/g of protein (Anitha and Indira, 2012). The potential value of earthworm as protein source had been established by several authors (Stafford and Tacon, 1988; Edwards and Niederer, 1988; Orozco *et al.*, 1988; Ortega *et al.*, 1996). Mattson *et al.* (2002) also suggested that earthworm provide a substantial nutrition to animals when consumed. The present findings reveal that the crude protein and carbohydrate content of the EWP was high both in quality and quantity ( $31.7\% \pm 0.011$  and  $4.1\% \pm 0.007$ ) respectively. This is similar to the findings of (Dedeke *et al.*, 2010) (i.e.) earthworm potentially superior to fishmeal and meat meal. The present study was in accordance with the result of Anitha and Indira (2012) that is, carbohydrate content of

earthworm *Eudrilus eugeniae* was  $4.34 \pm 0.010$ mg/g. Earthworms contain significant amount of several minerals that are nutritionally important (Paoletti *et al.*, 2003). The iron content of the earthworm *Lampito* was  $241.1 \pm 0.088$ ppm. This is supported by the analysis carried out on the dried earthworm powder, where iron was in the highest concentration (Ansari & Sitaram, 2010). This means that good bioavailability of iron in earthworms happens to be useful food source for iron deficiency anaemia. Similarly *Lampito mauritii* contains nutritionally significant amount of calcium ( $0.280 \pm 0.001$ ppm) which would be important for pregnant and lactating mothers and also becomes essential for blood clotting & muscle contraction. When compared with the study by Dedeke *et al.*, (2010) on macrominerals of four species of earthworms, the present study shows that the higher occurrence of potassium ( $0.5334\% \pm 0.003$ ) and phosphorus ( $0.385\% \pm 0.001$ ) in *Lampito mauritii* suggests that it is liable to contain a higher concentration of crude protein, since phosphorus plays an important role in energy metabolism affecting carbohydrates, lipids and protein. Also potassium is important for DNA, protein synthesis and cell volume regulation (Ganong, 1995). The result of the present study was identical with the study of Dickerson (1994), that is, the elements present in worms obtained from vermicomposting unit differ from garden soil. The dried garden earthworm powder (*Eisena fetida*) had approximately 11% soluble nitrogen. Their analysis show that, the elements ranging from highest to lowest concentration in the dried powder were zinc, copper, manganese, potassium, phosphorus, calcium, magnesium and iron respectively. In the present experiment EWP obtained from vermicomposting unit contains concentration of soluble nitrogen 1.8%. In dried earthworm (*Lampito mauritii*) powder iron was found in the greatest concentration (Table.1) The concentration range from highest to lowest includes iron, zinc, manganese, copper, nitrogen, magnesium, potassium, phosphorus and calcium. Finally the concentration of the elements analyzed in the earthworm powder happens to be different from that seen in previous research studies (Ansari and Sitaram, 2010).

**Table. 1:** Nutritional Profile of Earthworm Powder of *Lampito mauritii*.

S.No	Parameters	Mean $\pm$ S.D
1.	Carbohydrate (%)	4.1 $\pm$ 0.007
2.	Protein (%)	31.7 $\pm$ 0.011
3.	Nitrogen (%)	1.832 $\pm$ 0.074
4.	Phosphorus (%)	0.385 $\pm$ 0.001
5.	Potassium(%)	0.533 $\pm$ 0.003
6.	Iron (ppm)	241.1 $\pm$ 0.088
7.	Magnesium (ppm)	0.213 $\pm$ 0.018
8.	Manganese (ppm)	17.2 $\pm$ 0.014
9.	Zinc (ppm)	32.34 $\pm$ 0.068
10.	Copper (ppm)	4.504 $\pm$ 0.008
11.	Calcium (ppm)	0.280 $\pm$ 0.001

## CONCLUSION

The nutritional analysis of earthworm powder (*Lampito mauritii*) provides the quantitative evidences to support the assertion that, this species of earthworm is capable of satisfying the daily requirements of protein and other trace elements. Hence

EWP (*Lampito mauritii*) could be very well recommended as good source of carbohydrate and protein minerals. The researcher suggests that EWP (*Lampito mauritii*) could be incorporated as dietary supplement not only in the diets of fish or other animals but also in human life.

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