



## Comparative Efficiency of *Eisenia Fetida* and *Perionyx Ceylanensis* in Vermicomposting Implications for Sustainable Agriculture

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### ABSTRACT

The use of Vermicompost is gaining attention as a sustainable alternative to chemical fertilizers. This study compares the efficiency of two earthworm species, *Eisenia fetida* from Australia and the Indian variety *Perionyx ceylanensis* (Jai Gopal), in producing high-quality vermicompost. Parameters such as organic matter decomposition rate, moisture content, pH, and nutrient availability were measured to assess the compost quality. The study found that *Eisenia fetida* decomposes organic matter faster, while *Perionyx ceylanensis* produces compost with a balanced pH and higher microbial diversity. These results highlight the potential of utilizing a combination of both species to achieve optimal vermicompost quality, contributing to sustainable agricultural practices.

**Keywords:** Vermicomposting, *Eisenia fetida*, *Perionyx ceylanensis*, sustainable agriculture, compost quality, microbial diversity.

### INTRODUCTION

Vermicomposting is a rapid process that involves the bio-oxidation of the waste, the biological breakdown of the waste, and the stabilization of the waste as a consequence of the complex interactions between various species of earthworms and microorganisms. This method is also referred to as vermicomposting in some circles. The upshot of this is a phenomenon known as humification, in which organic stuff that was unstable is completely oxidized and then stabilized. The procedure quickens the rate at which the organic matter is broken down, which results in changes to both the material's physical and chemical characteristics. Vermicomposting, often known as VC, is a technique that involves the use of earthworms to convert organic waste into a material that is similar to humus and is known as vermicompost. Vermicompost often contains a significant amount of a wide array of essential nutrients. According to Kale et al. (1982), the process of composting has the potential to transform any and all of these different kinds of waste into rich materials. The effectiveness of the VC in terms of its positive effects on the physical, chemical, and biological characteristics of the soil, as well as its function as a source of nutrients, is directly influenced by the quality of the compost. In addition to this, the effectiveness of the VC is contingent on the quality of the compost. According to Bernal et al. (2009), the innovative paradigm of compost is that in order for it to be used safely in soil, it must first achieve a specific level of stability and maturity in addition to having a high nutritional value. This is in addition to the fact that it must have a high nutrient value.

### Vermicompost essential component of non-artificial farming methods

Vermicompost is an essential component of non-artificial farming methods such as organic agriculture, sustainable agriculture, and environmentally friendly agriculture. Its ability to raise the nutrient density of crops and increase the fertility of soil makes it an indispensable component of these farming approaches. This is due to the possibilities that are presented by vermicompost. Vermicompost is an essential component of organic farming systems because it contains properties that are useful and helpful for the growth of plants. It enhances the soil's physical, chemical, and biological characteristics, in addition to the soil's organic content, which can rise by a factor of 4.5 or even 4.5 times the original amount. Vermicomposting has been demonstrated time and again to be the most successful approach to treating an organic component of municipal solid waste. Vermicomposting resulted in a decreased emission of harmful gases (including CH<sub>4</sub>, NH<sub>3</sub>, and other pollutants), as compared to the standard composting procedures that are often used.

It is generally agreed upon that using earthworms as part of a treatment process for solid organic waste is among the most successful approaches. These wastes include those that are produced by human activity as well as agricultural activity and animal activity. Food wastes make for the biggest percentage of economic losses in India, which is not surprising given that India's yearly production of agricultural waste is roughly 350 million tonnes. These losses can be ascribed to excessive wasting, infection by rodents, or deposition in municipal garbage dumpsters, all of which result in pungent aromas owing to high levels of biological decomposition. These scents can be related to the high levels of biological decomposition. One of the earthworm species known as *Eisenia fetida* is responsible for the efficient decomposition and rotting of natural debris, which results in the production of high-quality organic compost from these discarded materials.