

Comparative study of Vermicompost formed by Earthworm Species *Perionyx ceylanesis* & *Eisenia fetida* for Selected Macro Nutrient Quality

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Abstract: Study was conducted to study the quality of compost produced by two species of earth worm. It was found that Earthworm species *Perionyx Ceylanesis* commonly called as "Jai Gopal" is comparatively better than exotic species *Eisenea foetida* commonly known as Red worm. It is due to its various characters like high fecundity, heat tolerance (up to 43°C ambient temperature), rich in protein content (of 67%) and presence of almost all proteinaceous amino acids. It breeds throughout the year except during low temperature winter. Jai gopal also acts as bio-reactor for multiplication of microorganisms beneficial to soil. This species is also comparatively better with respect to other parameters like number of cocoon formed every week, total number of population in every three months, longer life span, smaller interval of time period from hatchling to maturity and the adoption ability from 23 to 43°C. Thus these advantages make it more efficient, feasible and durable species.

Key words: *Perionyx ceylanesis*, *Eisenea foetida*

I. INTRODUCTION

The nutrient requirements of present generation are one of the most important demands of sustainable agriculture in the present scenario. The adverse impact of agrochemicals on land, water, food and overall environment had reaching at alarming level. Unsustainable agricultural practices has degraded environment rapidly. Thus to avoid further harm to environment and to shift towards sustainable agriculture, organic farming is the best option. Vermicomposting uses earthworm for the preparation of compost. Earthworms are voraciously feed on organic wastes and it excrete half digested organic substances and transformed into a form of vermicompost within a short time (Edwards, 1972). It provides vital nutrients necessary for plant growth and helps in maintaining human health by avoiding toxic contamination of soil, food grains and water. It is one of the most suitable bioconversion method for solid waste disposal and recycling of organic waste (Moorthi et. al 2006) Vermicomposting is carried out by different species of Earthworm. Among them one of the most frequently used species is *Eisenia fetida* commonly known as Red worm. Recently a new variety of earthworm was developed by Indian veterinary Research Institute

(IVRI), Izzatnagar, Bareilly known as Jai Gopal (*Perionyx ceylanesis*). It was developed by mating and selection of *Eisenia foetida* with *Eudrilus eugeneae*. Its advantages include high fecundity, high heat tolerance up to 43 °C and small time period from hatching to maturity as well as long life span with voracious feeder. Addition of this Jai Gopal improves physical, chemical and biological characteristics of soil. It also helps in rapid sustainable growth of plants.

II. MATERIALS AND METHODS

For the preparation of Vermicompost, a pit of size 1.5m × 2m × 1.5m was used in this work (Fig. 1). Then the pit was filled with buffalo dung and grass as composting material. It was mixed in the proportion of 3:1 respectively. Then it was allowed to partially decompose for 15 days. Two different species of Earthworms named *Eisenia Fetida* (Red worm) and *Perionyx ceylanesis* (Jai gopal) were used for Vermicomposting (Fig. 2).



Fig 1: Vermicomposting Pits

500-2000 individual of each Earthworm were introduced in separate pits. Proper aeration was maintained in both the pits by regular turning the composting material. Optimum Moisture level (30 to 40%) is maintained by regular sprinkling of water. Pit was kept in cool,

shady place to maintain optimum temperature of around 18 to 25°C for proper decomposition.



Fig 2: Vermicomposting material

TABLE 1: Comparison in vermicomposting in Jai Gopal and Esina fetida.

S.No	Parameter	Result (Jai Gopal)			Result (Red Worm)			Method of Analysis
		Date of Analysis			Date of Analysis			
		28/02/19	9/3/2019	15/03/19	28/02/19	9/3/2019	15/03/19	
1	pH	7.3	7.2	7.44	8.66	9	9.11	Digital pH Meter
2	Electrical Conductivity(ds/m)	1.8	1.94	2.26	8.2	8.87	9.39	Digital Conductivity Meter
3	Organic carbon	High	High	High	High	High	High	Soil Testing Kit

III. RESULTS AND DISCUSSION

The analysis of vermicompost of two different species of Earthworm indicates that vermicompost of species Jaigopal (*Perionyx ceylanesis*) is superior in quality in compare to vermicompost prepared from Red Worm (*Eisenia fetida*) as it is having higher percentage of most of the important soil parameters like organic carbon, electrical conductivity, Nitrogen, phosphorus and potash. Vermicompost prepared from Jaigopal (*Perionyx ceylanesis*) is having higher proportion of organic carbon in compare to Red Worm (*Eisenia fetida*) so they will enhance soil fertility more by improving structure of soil and number of beneficial microorganisms. Increased presence of Nitrogen in Vermicompost will affect carbohydrate and Protein synthesis, photosynthesis, increase in leaf surface (shoot growth), length of growing

season, and delays maturity. Vermicompost with higher percentage of phosphorus is likely to have early root and shoot development and better formation of seeds and fruit. Increased level of potassium will increase photosynthetic activity of leaves, synthesis of amino acids, proteins and sugar, resistance to disease is increased along with increasing plumpness of the grains. Increase Electrical conductivity in vermicompost of species *Perionyx ceylanesis* indicates that amount of nutrients available for plant growth are available more in Jaigopal (*Perionyx ceylanesis*). Vermicomposting species Jaigopal (*Perionyx ceylanesis*) is also better than exotic earthworm species *Eisenia foetida* due to the characteristics like they have high fertility rate, ability to adapt to variable temperature from 20 to 45°C ambient temperature, have a long Life span ,

hatching to maturity and fast conversion of animal and agricultural waste into superior quality of vermicast. Vermicompost of *Perionyx ceylanesis* species is very rich in proteins and there is presence of all functional amino acids. So we can say that as Vermicompost prepared from *Jaigopal* (*Perionyx ceylanesis*) is having better soil physical and chemical characteristics in comparison to *Eisenea foetida* and is likely to have better impact on plant growth if we utilized it as a growing medium.

IV. CONCLUSIONS

Vermicomposting of organic wastes by Red Worm (*Eisenea fetida*) and *Jaigopal* (*Perionyx ceylanesis*) improves soil physical and chemical characteristics. Out of the two species utilized for processing of organic wastes into useful manure, *Jaigopal* (*Perionyx ceylanesis*) is found to have better chemical characteristics so they may enhance soil fertility more and thus promote plant growth. Chemical fertilizers although help in food production but they are harmful for environment in the long run. The advantage of using Vermicompost as a medium for plant growth is that it improves soil fertility without harming environment especially soil. Food production is improved and soil is not degraded, so overall agriculture is sustainable.

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