

IDENTIFICATION & SELECTION OF SUITABLE VERMICOMPOSTING SPECIES BASED ON CHEMICAL ANALYSIS OF VERMICOMPOST

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Abstract- Vermicompost is formed by decomposition of organic waste by the help of Earthworms and microbes. The advantage of using Vermicompost in soil is that it improves Soil Physical, Chemical and Biological Characteristics. The addition of Vermicompost increases porosity, Water holding capacity. The present papers aims to identify the vermicompost that may better promote or aid plant growth based on the study of analysis of chemical characteristics of vermicompost prepared from *Eisenia fetida* and Jai Gopal (*Perionyx ceylanesis*). The findings of this paper showed that vermicompost prepared from Jai Gopal (*Perionyx ceylanesis*) is found to be better than vermicompost of *Eisenia fetida* as the soil parameters required for good plant growth are more prominent in vermicompost of Jai Gopal (*Perionyx ceylanesis*).

Keywords – Vermicompost, *Eisenia fetida* , Jai Gopal (*Perionyx ceylanesis*), Chemical Characteristics

I. INTRODUCTION

Meeting the food requirements of present generation without compromising with the needs of future generation food requirements and causing harm to our environment is of the most important demand of sustainable agriculture in the present scenario. The adverse impact of agrochemicals on our land, water, food and overall environment has affected us and had reaching alarming level. We have degraded our environment through unsustainable agricultural agricultural practices. So in this situation to avoid further damage to environment and to move towards sustainable agriculture, organic farming through vermicomposting not only provides vital nutrients necessary for plant growth but also helps in maintaining human health by avoid toxic contamination in soil, food grains and water .Vermicomposting or processing of organic wastes into useful manure is carried out by different species of Earthworm. One of the most commonly used species used frequently for vermicomposting is *Eisenia fetida*. Recently a new variety was developed by Indian veterinary Research Institute,Izzatnagar ,Bareilly known as Jai Gopal (*Perionyx ceylanesis*) which is developed by mating and selection of *Eisenia foetida* and *Eudrilus eugeneae*. The addition of vermicompost in soil improves soil physical, chemical and biological characteristics and help in growth of plants without damaging environment .

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II. STUDY AREA LOCATION AND CLIMATIC CONDITIONS

Lucknow is the capital of Uttar Pradesh situated on 26° 30'- 27° 10' North latitude and 80° 30'- 81° 13' East longitude, covering an area of 2528 km². It is surrounded by district Barabanki on Eastern Side, district Unnao on western side, Raebareli on the southern side and Sitapur and Hardoi districts on the northern side. The city is located on the north- western shore of Gomti river Lucknow has a warm humid subtropical climate with maximum temperature in winter around 25 °C and minimum in the range of 2 to 3 °C. In summers temperatures are very hot and may rise to 40 to 45 °C range. Lucknow receives an annual rainfall of about 896.2 millimeters from June to September months.

III. MATERIAL & METHOD

Vermicompost Formation:-

Vermicompost pit of size 1.5m × 2m×1.5m was prepared for Vermicompost formation. Then the pit was filled with buffalo dung and grass. Buffalo dung and grass was used as composting material. Buffalo dung and grass was mixed in the proportion of 3:1 and is allowed to partially decompose for 15 days. Two different species of Earthworms species Eisenia Fetida and Jaigopal (Perionyx ceylanesis) were used for vermicomposting. 1500-2000 Earthworms were inoculated in each pit. Proper aeration should be maintained in Vermicomposting unit by regular turning the composting material. Optimum Moisture level (30 to 40%) is maintained by regular sprinkling of water. Vermicomposting pit is kept in cool, shady place to maintain optimum temperature around 18 to 25°C for proper decomposition.



Figure1:- Vermicomposting of wastes by species Eisenia fetida and Jai Gopal” (Perionyx ceylanesis)

Vermicomposting Species:-

Organic wastes are converted into compost by two species Red worms (Eisenia fetida) and Jai Gopal” (Perionyx ceylanesis)

S.No.	Name of earthworm	Characteristic
1	Red worms (<i>Eisenia fetida</i>)	Small, red in colour, tolerates wide range of environmental conditions, can feed on wide variety of organic wastes, faster growth and multiplication.
2	Jai Gopal” (Perionyx ceylanesis)	Developed through selection and mating plan which is better than exotic earthworm <i>Eisenia fetida</i> , <i>Eudrilus eugeneae</i>

Table 1: Vermicomposting Species & their Characteristics

V. RESULT & DISCUSSION

S. No.	Name of Vermicomposting Species	% OC	pH	EC	Total Carbon %	N %	P %	K%	Zn %	Fe %
1	<i>Eisenia fetida</i>	5.9	7.37	0.29	9.201	0.970	1.556	1.315	0.0049	0.3208
2	Jaigopal (<i>Perionyx ceylanesis</i>)	8.7	7.40	0.33	17.559	1.072	1.626	1.659	0.0058	0.3575

TABLE 2 :- Analysis of Vermicompost

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 *Eisenia fetida* as it is having higher percentage of most of the important soil parameters like organic carbon, electrical conductivity, total carbon, Nitrogen, phosphorus, potassium, zinc and Iron. Vermicompost prepared from Jaigopal (*Perionyx ceylanesis*) is having higher proportion of organic carbon (**8.7**) in compare to *Eisenea fetida* (**5.9**) so they will enhance soil fertility more by improving structure of soil and number of beneficial microorganisms. Physical properties of soil like water holding capacity, infiltration, gaseous exchange and root growth will also be promoted.

Increased presence of Nitrogen (**1.072**) 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 (**1.626**) is likely to have early root and shoot development and better formation of seeds and fruit. Increased level of potassium (**1.659**) 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 presence of zinc (**0.0058**) will increase growth, seed and bud development, level of chlorophyll. Increase Electrical conductivity (**0.33**) 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 *Eisenea foetida* due to the characteristics like they have high fertility rate, ability to adapt to variable temperature from 20 to 43⁰ 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.

V.CONCLUSIONS

Vermicomposting of organic wastes by *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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