iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VIII **Month of publication:** August 2019

DOI: http://doi.org/10.22214/ijraset.2019.8081

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VIII, Aug 2019- Available at www.ijraset.com

Bioremediation of Soil using Earthworms Castings

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Abstract: ***Vermicomposting is a process by which organic waste is converted to biofertilizer using earthworms. The effect of vermicompost on plants is already known ,the present paper aims at studying the effect of vermicompost on the soil quality. Red soil mixed with some clay soil was taken in potted plants and different herbs namely, Mint, Coriander and Gongura were grown. These common herbs were chosen as they grow very rapidly and it is easy to see the result with a very short time. Half of them were treated with vermicompost and others were treated with common pesticide. It was observed that the soil which was treated with vermicompost was more porous and had more mineral content compared to the soil treated with pesticide.***
Keywords: Vermicompost, Pesticide, Soil quality, Minerals, Earthworms.

I. INTRODUCTION

Vermicompost contains major and minor nutrients it also contains growth hormones, antibiotics and vitamins which are beneficial for the growth of crops, flowering and fruits settling and resistance to pest and diseases. Compost also contains calcium, humus which improves soil structure and moisture holding capacity. Vermicompost is an excellent soil fertilizer and a biocontrol agent which make it the best organic manure and more eco-friendly as compared to chemical fertilizers. Vermicompost is an ideal organic manure for better growth and yield of many plants. It can increase the production of crops and prevent them from harmful pests without polluting the environment.

Soil can be degraded and the community of organisms living in the soil can be damaged by the misuse or over use of pesticides. Due to the continuous use of pesticides in agriculture, appreciable quantities of pesticides and their degraded products may accumulate in the ecosystem leading to serious problem to man and the environment. Pesticides, which enter the soil environment, are subject to a variety of degradative processes. The overall degradation of a pesticide from soil results from a combination of mechanisms such as microbial degradation, chemical hydrolysis, photolysis, volatility, leaching and surface runoff. Some pesticides are more toxic to soil organisms than others. Some pesticides may break down quickly when applied to soils, while others may persist for longer periods. The type of soil and the type of pesticide can also affect pesticide persistence.The effect of vermicompost on plants is well known but the effect of Vermicompost on Soil already treated with pesticide is highlighted in this paper.

A. Materials Required

Burette, Beakers, Conical flasks, Pipettes, Ammonium molybdate, Conc. HCl, distilled water, EDTA solution, Solo chrome dark blue, Eriochrome black T.

B. Method

The following are the methods to determine various parameters mentioned above.

C. Porosity

The porosity of the soil was determined by measuring the amount of water it takes to fill the tiny pores in the soil by saturation method.

D. Phosphorus Test

Fill glass vital with ammonium molybdate(reagent). Add add 1 tea spoon of soil extract. Shake the contents vigorously. Filter the solution and add 0.1 ml of reagent. Add stannous chloride powder till the colour becomes intense. Blue colour indicates adequate phosphorus and yellow colour indicates low phosphorus content.

E. Calcium- Magnesium Test

5 ml of salt solution is taken in conical flask. Then 2 ml of buffer solution and 4-5 drops of indicator (Solo chrome dark blue for calcium and , Eriochrome black T for Magnesium) is added. The mixture turns red. Then the content is titrated against 0.0.1 M EDTA solution, until the colour changes from red to blue. Disappearance of the last tinge of red colour indicates the end point. The metal content of the solution is then calculated by using the known EDTA metal-complexing data.

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F. Observation

Porosity

S.No.	Test	Vermicompost	Pesticide
1.	Porosity	More	Less
2.	Phosphorus	Blue colour	Yellow colour
3.	Calcium	0.75	0.45
4.	Magnesium	0.65	0.4

II. RESULT

The porosity,Phosphorus, Calcium and Magnesium content was found to be comparatively more in soil treated with vermicompost when compared to that with pesticide.

III. DISCUSSION AND CONCLUSION

This suggests that vermicompost can be used for Bioremediation of Soil .The soil which becomes infertile after continuous usage of pesticide and the soil on barren lands can also be made usable by subjecting them to Vermicomposting. Awareness should be created about the usage of vermicompost instead of pesticide as it improves soil aeration, enriches soil with micro-organisms, attracts deep-burrowing earthworms already present in the soil and improves water holding capacity.

The castings are rich in humus which conditions the soil and help balance pH and improve nutrient recycling. The microbial activity in worm castings is 10 to 20 times higher than in the soil and organic matter that the worm ingest. Thus vermicompost is the best organic manure that can be used as it is hassle free, smell free, cheap and easy to procure.

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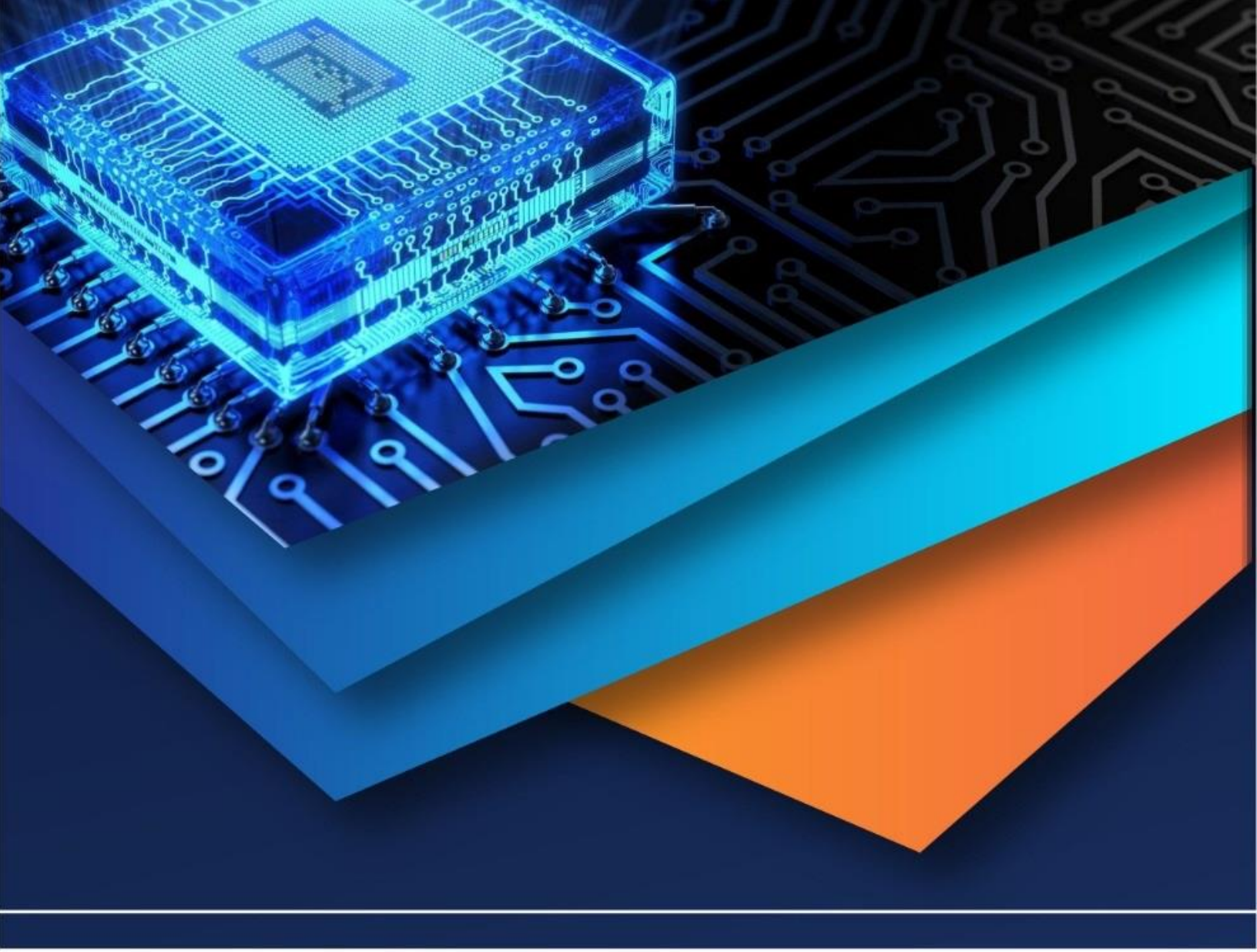

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