



CARBENDAZIM AND CARBOFURAN INDUCED EFFECT ON BIOCHEMICAL PARAMETERS OF EUDRILUS EUGENIAE, KINBERG, 1867 (ANNELIDA: EUDRILIDAE)

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ARTICLE INFO

Article History:

Received 6th July, 2018

Received in revised form 15th August, 2018

Accepted 12th September, 2018

Published online 28th October, 2018

Key words:

Digestion, worm, pesticide, weeds, vermicompost, residue. Biomolecule.

ABSTRACT

The earthworm forms major components of the soil system & these organisms have been efficiently ploughing the land for millions of the year and recycling the organic materials for efficient growth of plants. The Waste biomass from domestic, agricultural urban and industrial sources the environmental pollution in developing countries. It can be easily recycled by the activity of the earthworm to produce remarkable vermicompost. It plays an important role in the fragmentation and breakdown of plant and organic waste material reaches to the soil and it get decomposed so earthworm is considered as vital component of the terrestrial ecosystem. (Baker, G.H. (1998). The bioaccumulation of pesticides in earthworm may not lead to significant effect to the animal itself but may produce serious damage to higher tropic level. (Van Gestel *et al.*, 1992). The contaminated humus soil along consume by the worm and acts on its physiological functions properly. Enzyme secreted in the gut of the worm will help to digest the food as well as play their role in other metabolic processes of the body of an animal but the chemical residue act on body tissue, finally the worm affected due to contaminant of pesticides to the tissue, showed clinical significance on pathological consequences.

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INTRODUCTION

The earthworm is a invertebrate annelid burrowing, nocturnal terrestrial, hermaphrodite animal. Earthworms are distributed all over the world. It has long slender, segmented bilaterally symmetrical body. Earthworm has neither head nor distinct appendages. The posterior end is more or less blunt and anterior end is tapering thus the shape and size of the animal is adapted for burrowing. The mature worm measured about 15 cm in length and 5mm in thickness. The body of earthworm is metamericly segmented containing 100 to 120 segments with locomotary organ setae except first and last segment. The earthworm is a invertebrate annelid burrowing, nocturnal terrestrial, hermaphrodite animal. Earthworms are distributed all over the world. It has long slender, segmented bilaterally symmetrical body. This is a good substitute for chemical fertilizer has more NPK than normal heap of manure (Shrivastav and Beohar, 2004). The process of converting organic waste by earthworm consumption into nutrients filled human is called Vermicomposting. Even worm casting improve natural soil condition so it is also called “gardeners gold” on account its excellent soil amending value. (Dash & Senapati, 1986) Vermicomposting thus has multiple objectives like waste management enhancement of soil need management and sustainable agriculture.

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The method of covering all biodegradable waste such as farm waste, biological waste, market waste into vermicompost by the action of earthworms digestive enzyme get convert into valuable for agriculture. Although many species of earthworms are suitable for waste processing two species namely *Eisenia fetida* and *Eudrilus eugenie* have been taken into consideration for vermiculture. Their growth productivity & activity to transform organic work like sludge have been widely reviewed (Edward, et.al, 1998). The use of vermicompost is the best way to improve structure of soil and soil fertility. The technology of vermicompost is simple, economical, environmental and socially best. An appropriate vermicomposting technology will make the recycling of organic waste rapidly feasible which can help to provide renewable source of plant and to minimize the environmental pollution. (Edward et.al., 1985). The earthworm represent the great proportion of biomass of terrestrial invertebrates and therefore they are suitable indicators of chemical contamination of the soil in terrestrial ecosystem providing an earlier warning of deterioration in soil quality (Bustos *et al.*, 2002; Culy and Berry,1995; Shahala and D’Souza, 2010; Sorour and Larink, 2001). Studies have shown that the earthworm skin is a significant route of contamination (Lord *et al*, 1980; Shahala and D’Souza, 2010) and thus the investigation of earthworm biomarkers in the ecological risk assessment can be helpful (Sanchez –Hernandez, 2006)

MATERIAL AND METHODOLOGY

Biological material: In the beginning of the experiment Healthy and approximately same sized *Eudrilus eugeniae*

species worm's were collected from vermicompost unit and brought to the laboratory and acclimatized it in laboratory through the method described by Owa, *et al.*, (2003).

Selection of pesticides: A chemical Carbendazim containing fungicide brand name Bavistin manufactured by BASF India, Mumbai. (India) and Carbofuran containing nematocide brand name Furadan manufactured by Sygenta India Ltd. Pune (India) pesticides were selected for the experiment.

Bioassay: Acute toxicity was calculated by bioassay studies carried out to determine the potency of pesticide through exposure system. Soil used for acclimatization and conducting experiment was clear tap water. The maximum sized active acclimatized earthworms were selected for the evaluation of toxicity. Acute toxicity tests data was collected and analyzed statistically by mean of the probit methods on transforming the toxicity curve into regression line (Finney, 1951). In order to fix concentration a preliminary range finding or screening test was conducted. The test was conducted by static method. A group of 10 earthworms were exposed to ten trays for different concentrations in ppm of commercial grade fungicide Carbendazim and nematocide Carbofuran for 24,48,72 and 96 hrs.

Assessment of LD₅₀: (50% lethal dose): The LD₅₀ values were calculated for the fungicide Carbendazim was 3.763 ppm, nematocide Carbofuran was 0.1993 ppm respectively. The Acute toxicity of earthworm is an efficient tool in assessing ecological risks of the contaminated soils demonstrated by (Lukkari *et al.*, 2005; Hemibach, 1985) and the end point is mortality (Karnak and Hamelink, 1982; Dean-Ross, 1983; Ellis *et al.*, 2007).

Biomolecule estimation: The biochemical analysis is most important study in research refers to set of methods, assay and procedure that enable to analyze the bimolecular substances found in living organisms and the chemical reactions underlying life processes. In the present study biomolecule like the biomolecule like carbohydrate was estimated by Anthrone reagent method of Hodge, J. E and Hofreiter, B.T., (1962). The total protein content were estimated by using Lowry's method (Lowry, *et al.*,1951) and the content of lipids can be estimated by using vanillin reagent and cholesterol as standard as given by Barnes and Blackstock., (1973)

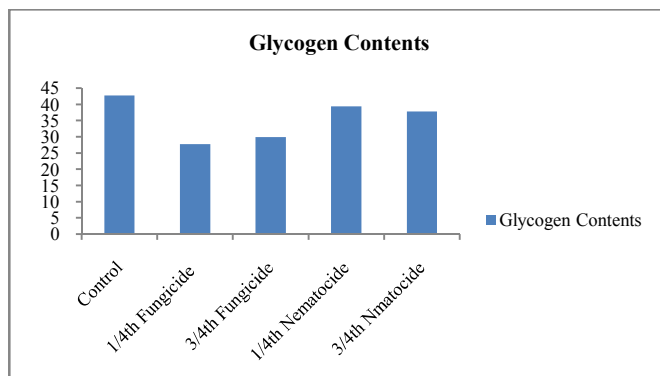
RESULT AND DISCUSSION

The bio molecules are the important rich source of energy to all organisms to generate energy for various metabolic processes of the body. The carbohydrate is the fundamental biomolecule that provide energy for metabolic processes. It is also important component of the structural material of living organisms. Proteins are present in all the tissue as it is a major building block of the body of an animal. The lipid plays their role as major storage of energy in the body and also acts as insulator to the body.

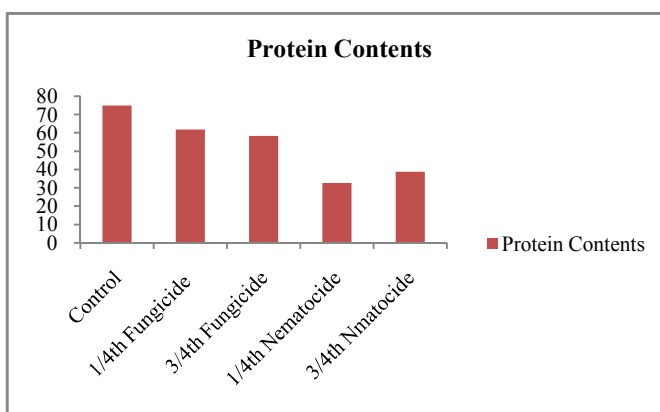
Table No 1 Biochemical contents

Sr. No.	Treatments	Glycogen Contents	Protein Contents	Lipid Contents
1	Control (without chemical)	42.75 ± 0.24	74.89 ± 0.41	6.82 ± 0.25
2	1/4 th dose of fungicide Treatment	27.75 ± 0.12	61.87 ± 0.27	5.27 ± 0.27
3	3/4 th dose of fungicide treated worm	29.87 ± 0.14	58.38 ± 0.16	5.78 ± 0.12
4	1/4 th dose of nematocide Treatment	39.35 ± 0.16	32.68 ± 0.22	6.52 ± 0.10
5	3/4 th dose of nematocide Treatment	37.83 ± 0.23	38.77 ± 0.20	5.93 ± 0.16

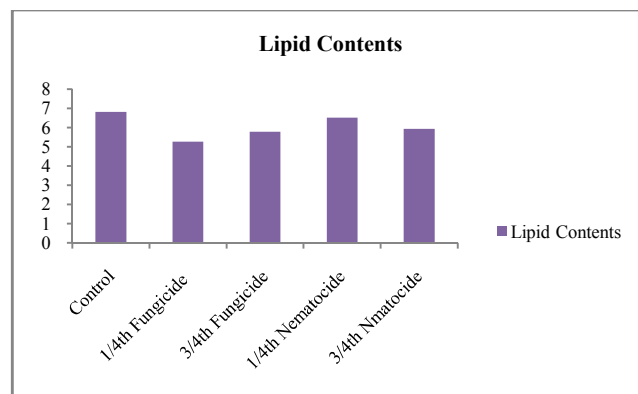
(All values expressed in %mg/100mg in dry weight of the tissue, ± indicates S.D.)



The carbohydrates are the fundamental biomolecule present in the body of the living organisms. It is a main and cheapest source of energy for the metabolic activities. The glycogen content in 1/4th dose of fungicide treated worm was 27.75 mg and in 3/4th dose of fungicide treated worm was 29.87 mg where as 1/4th dose of nematocide treated worm glycogen contents was found 39.35 mg and in 3/4th dose of nematocide treatment was found 37.83 mg while in the control worm it was 42.75mg.



The Protein are most abundant macromolecule constitute over half of the dry weight of most organisms. Proteins are the organic compound, which made up of carbon, hydrogen, oxygen and nitrogen. It plays an important role in biological processes as a catalyst and restores the genetic information. In addition these protein used as source of energy.



The protein content in 1/4th dose of fungicide treated worm was 61.87 mg and in 3/4th dose of fungicide treated worm was 58.38 mg where as 1/4th dose of nematocide treated worm glycogen contents was found 32.68 mg and in 3/4th dose of nematocide treatment was found 38.77 mg while in the control worm it was 74.89 mg.

Lipids are the rich source of energy. It also acts as insulator. The lipid associated with other components in the physiological function of the animal body. The lipid content in 1/4th dose of fungicide treated worm was 5.27 mg and in 3/4th dose of fungicide treated was 5.78 mg where as 1/4th dose of nematocide treated worm glycogen contents was found 6.52 mg and in 3/4th dose of nematocide treatment was found 5.93 mg while in the control worm it was 6.82 mg.

From above findings it was concluded that the biomolecule quantity consistent found greater than the treated worm with lower and higher doses of fungicide and nematocide. The bioaccumulation of pesticides in worm may not lead to significant effect to the animal itself but may produce serious damage to the internal body tissue and organ systems of the animal.

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How to cite this article:

Ashok K.Yeole (2018) ' Carbendazim and Carbofuran Induced Effect on Biochemical Parameters of Eudrilus Eugeniae, Kinberg, 1867 (Annelida: Eudrilidae) ', *International Journal of Current Advanced Research*, 07(10), pp. 15737-15739. DOI: <http://dx.doi.org/10.24327/ijcar.2018.15739.2884>
