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Toxic effect of cythion and dieldrin on the biomass of Earthworms (*Eisenia foetida*)

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Abstract: ***This research has demonstrated the importance of earthworm in agriculture. The survival rate was diminished due to the toxic impact of cation and dieldrine was found to be important as compared to control. The cythion and dieldrin affected on the biomass of the crawler. We had taken acute test for effects of selected pesticide on the earthworms Eisenia foetida. We were using different concentrations of pesticide like 4, 8, 12, 16 and 20 mg/kg of dieldrin and 3, 6, 9, 12 and15 mg/kg of cythion.***

Key words-: ***Cythion, Dieldrine, Esenia feotida, biomass.***

I. INTRODUCTION

Earthworms are ubiquitous, being among the most widely distributed invertebrates occurring over most of the land, and preferring moist soil rich in calcium and organic matter. They inhabit burrows for protection from adverse weather and predators and may penetrate far below the open to avoid extreme high temperature, cold, or drought [1]. In real dry or very hot conditions, they burrow deep and go inactive [2]. According to them Darwin found several small rocks or grains of grit in the gizzards of many earthworms which are sometimes combined with the hard calcareous concretions formed by calciferous glands. These coarser particles are apparently ingested and applied by the worms to help ingested soil organic matter and leaves, and to facilitate digestion. These will, by particle attrition and conversion through the gizzard and the gut, check up larger molecules, thereby contributing to the physical weathering of soils [3].

Earthworms represent a large balance of biomass of terrestrial invertebrates (80%) and so they are suitable bio-indicators of chemical contamination of the soil in terrestrial ecosystems providing an early warning of deterioration in soil quality reported by Bustosobregon and Goicochea, (2002); Culy and Berry, (1995) [4] [5]. Surveys hold demonstrated that earthworm skin is a significant route of contaminant uptake documented by Shahla and D'souza, (2010) and this investigation of earthworm biomarkers in the ecological risk assessment can be helpful [6]. The pesticide effect on earthworms depends on the used chemical means. Generally, herbicides manifest low toxicity on earthworms, but indirectly can produce the reduction of the populations by decreasing the organic matter input and weed coverage. Booth and O'Halloran, (2001); Booth, *et al.,* (2000) Abdul Rida and Bouche, (2007) studied the fungicides and fumigants are very toxic substances for earthworms [7] [8] [9].

II. MATERIAL AND METHODS

EXPERIMENTAL ANIMAL

Earthworm, *Eisenia foetida* (Savigny, 1826) is a recommended earthworm test species by Organization for Economic Co-operation and Development [10] and European Economic Community [11].

ANIMAL COLLECTION

Earthworm, *Eisenia foetida* brought from commercial suppliers, Nursery Department of Forest, Wadali, Amravati and adopted as the test species, recommended by OECD [12] guideline for testing of chemicals no. 207, earthworm, and acute toxicity tests.

ACUTE TEST FOR BIOMASS

The short term toxicity test was analyzed for showing the impact of selected pesticide on survival and biomass of earthworm. This trial was examined according to OECD guideline No. 207 [12] for survival and biomass. The ground was applied for this examination was the artificial land. Soil water content was measured and moisture content was held every week to achieve maximum holding capacity. In the present experiment, acute toxicity test set at different time periods2, 4, 6, 8, 10 and 14th days and different concentrations of pesticides were added to the soil, cythion were 3mg, 6mg, 9mg, 12mg and 15mg/kg dry weight soil and dieldrine were 4mg, 8mg, 12mg, 16mg and 20mg/kg dry weight of soil. Fully clitellated mature worms were collected from the uncontaminated soil. At the start of the experiment the worms were sorted, rinsed with water and blotted with filter paper than weight was needed by electric balance and added to the respective test jars contained soil. 3 copy of each concentration were arraigned and 10 earthworms were kept to each experimental replicate and covered with a porous fabric plate to provide sufficient ventilation. At the conclusion of treatment period of control group and intoxicated group, the worms were sorted by hand and the result was assessed by comparing mean final result of treated group with control as important or non significant.

STATISTICAL ANALYSIS -: ANOVA

III. RESULT

A) TABLE: IMPACT ON THE BIOMASS OF EARTHWORM EXPOSED TO CYTHION AT DIFFERENT TOXICATION PERIODS.

DAYS/DOSES	2	4	6	8	10	14
CONTROL	17.7±4.2	20.7±4.5	21±4.6	23.4±4.8	31.5±5.6	49.5±7.0
3MG/KG	17.7±0.	19.05±2.3	19.65±2.7	21±3.39	25.35±8.6	34.5±21.2
6MG/KG	18±4.24	18.9±4.34	19.5±4.4	20.7±4.5	24.9±4.9	34.05±5.8
9MG/KG	18.15±4.2	19.05±4.3	19.35±4.3	19.95±4.4	24.45±4.9	34.2±5.8
12MG/KG	18.4±4.2	19.2±4.3	19.5±4.4	20.1±4.4	24.3±4.9	33.4±5.7
15MG/KG	18.3±4.2	19.2±4.3	19.35±4.3	20.2±4.5	24.6±4.3	33±5.7*

** Significant differences (P < 0.05) were not found between treatment and control groups were found 0.08 and 0.01 in concentration of cythion (ANOVA).*

B) TABLE: IMPACT ON THE BIOMASS OF EARTHWORM EXPOSED TO DIELDRIN AT DIFFERENT TOXICATION PERIODS.

DAYS/DOSES	2	4	6	8	10	14
CONTROL	22.5±1.35	24±1.45	25.8±1.5	29.4±2.37	42.6±6.9	60.69±1.5
4MG	18±2.4	21.6±2.6	23.4±2.7	27±3*	24.6±2.8*	28.5±3.0*
8MG	18.6±2.4	20.7±2.6	21.6±2.6*	22.5±2.7*	22.8±2.7*	27.9±3.04*
12MG	17.7±2.4	17.7±2.4	21.9±2.7	21.6±2.6*	22.2±2.7*	24±2.8*
16MG	15.3±2.2	15.3±2.2	17.1±2.3	18.3±2.4*	15.9±2.3*	19.5±2.5*
20MG	18.6±0.0	18.6±0.3	17.4±1.2	15±2.4*	14.4±3.1*	17.4±4.0*

** Significant differences (P < 0.05) were found between treatment and control groups were found 0.02 (ANOVA).*

IV. DISCUSSION

EFFECTS OF CYTHION AND DIELDRIN ON THE BIOMASS OF EARTHWORMS (*EISENIA FOETIDA*)

Initial increase in biomass was due to greater accessibility of nutrient. The reduction in biomass may be ascribable to the fact that the waste undergoes microbial stabilization during the process, consequently lowering the nutritional value of the substrates. Suthar recorded a rapid growth in biomass there after market stabilization followed by a gradual fall in growth rate was recorded in the remainder [13]. In the lowest concentration of same toxicants resulted above from 3mg/kg to 12mg/kg for 14 days brought about non-significant difference, but same toxicant at highest concentrations dose (15mg/kg) produced a substantial impact on the biomass of the earthworm as compared to control. In the lowest dose concentration (table A) of cythion showed non-significant impact of biomass of earthworm in all treatment periods, but the result value produced near to significant impact on biomass of earthworm.

In (table B) at the dose of 6mg/kg soil there the rate of biomass of earthworm was 18±4.24 which reaches up to 34.05±5.8 and found to be significantly less in comparison to its dominance. Thus the impact of the present concentration of stone could not affect on biomass of earthworm. In the lowest concentration of same toxicants resulted above from 3mg/kg to 12mg/kg for 14 days brought about non-significant difference, but same toxicant at highest concentrations dose (15mg/kg) produced a substantial impact on the biomass of the earthworm as compared to control. Thus, it was shown that the impact of cation on earthworm was dose dependant. We had used two pesticides caution and dieldrin and the effects were recorded on the earthworm ezine foetida during the experimental period as well as at the conclusion of the experimentation. A substantial reduction in earthworm biomass after exposure to different concentrations of copper chloride and concluded that dysfunction of a major physiological systems such as digestion and absorption with consequent disturbed metabolism resulted in biomass reduction [14].

Similar effects were observed by Booth and O'Halloran,[7] where growth found to be significantly trimmed in a caliginosa by exposure to two OP pesticides, diazinon and chlorpyrifos, at 60 and 28 mg/kg doses. In the present work, the earthworm biomasses were changed accordingly dose and duration dependent. The biomass were noted every 2 days and observed at following intervals 2, 4, 6, 8, 10 and 14days. We had found that a gradual decrease in biomass of earthworm after 4mg/kg concentration of (Organochlorine) dieldrin and consequential at 6, 8, 10 and 14 days. In the present work (table B) the toxicity of dieldrine was estimated. It was found that the outcome was significantly altered the biomass of the earthworm as compared to untreated earthworm. The alteration was observed continuously from 6 to 14 days of toxication.

From (table B) showed that biomass were found to be declining up to 4 days away.Toxication which onwards went on decreasing till the conclusion of the experiment. The outcome of the present study exhibited a significant difference between discourse and control group. From the present field data (table B) determined that the biomass change was observed during dieldrine toxication at 12mg/kg cythion. It was produced significantly decreased in the biomass of earthworm compared to the relevant control. In the present study data (table A) clearly showed that declined in biomass was observed in all days of experimentation. The decrease was found to be going along at different exposer periods 2, 4, 6, 8, 10 and 14th days. The effects of acute test are summarized indicates that the biomass of earthworm were significantly changed during the toxication of dieldrine at this concentration. The decrement was observedatThe early days of toxication, which later on gradually decline up to 14 days. At the same days the controls were shown incremented in biomass of earthworm. Likewise, at 3ml concentration of the (Organophosphate) caution produced more impact than the (Organochlorine) dieldrin, at 6, 8, 10 and 14 days and at 2 and 4 days showed lesser impact on the biomass.

We incremented the dose of the (organochlorine) dieldrin and (organophosphate) cythion we had found at 8mg/kg concentration of the (organochlorine) dieldrin showed the impact and consequential on 6, 8, 10 and a 14^{th}, the earthworm biomass decremented or not transmute than the control, the control biomass was incremented. The (organophosphate) cythion 6mg/kg concentration cythion showed the very impact on the earthworm biomass than the 8mg/kg concentration of the (organochlorine) dieldrin. The 12mg/kg concentration of the (organochlorine) dieldrin showed more impact than the 4mg/kg and 8mg/kg concentration of the (organochlorine) dieldrin. The 12mg/kg concentration showed paramount 8, 10 and a 14^{th}.

The earthworm biomass was very remotely incremented in 10 and a 14^{th} in 12mg/kg concentration of (organochlorine) dieldrin. The 9mg/kg concentration of (organophosphate) cythion showed more toxic impact in 4, 6, 8, 10 and 14^{th} days on the biomass of the earthworm similarly the control was shown incremented in 4, 6, 8, 10 and 14^{th} days. The 16mg/kg and 20mg/kg concentration of the (organochlorine) dieldrin showed very toxic impact than the 4, 8 and 12mg/kg concentration, the earthworm getting lost their size and weight. That signifies highly attack on the earthworm biomass. Similarly the (organophosphate) cut-in 12mg/kg and 15mg/kg concentration showed the shock on the biomass of earthworm. The earthworm decreased their weight and size Espinoza-Navarro and Bustos Obreg´on treated *Eisenia fetida* with organophosphate insecticide malathion and Bustos-Obreg´on and Goicochea explored the effect of exposure to commercial parathion on *Eisenia fetida* both observed decrease in the body weight of treated worms [4]. Caution concentration of present (table A) showed slightly decreased the rate of survival of earthworm from 2 to 6 days, but highly important effect was observed at 8, 10, and 14 days of toxication periods.

Weight loss had also been reported for organochlorine pesticide intoxication [15] [16]. The earthworm biomass are depended on the surroundings and the character of the land, the felicitous environment and highest act of organic materials is consequential for the biomass of the dew worm, but the pesticide is very deleterious because of the astronomically immense number of utilized in agriculture which directly impact on the very paramount species' like an earthworm.

The whole group impact from the pesticide. They have been losing their activeness and there, it's function. In the present investigation, we found that 20 mg/kg concentration of the dieldrin found to be super toxic on the earthworms and the 15 mg/kg concentration of cythio was also super toxic on the earthworms as compared to control. On the other hand the 4mg/kg concentration of dieldrin expressing no impact. Then slightly increased impact was observed from 2, 4 and 6 days till 8 days.

The Same concentration of the pesticides was highly toxic on earthworm at 4, 6, 8, and 10 and fourteenth that mean short term impact on the earthworm survives because of consequential and super toxic effect of dieldrin. The cythion showed highly impact in 6, 8, 10 and 14th days than the dieldrin. The kitchen showed very super toxic and very significant impact in the 14th days on the crawler. That mean cythion showed long and short term effect on the earthworm survival.

V. CONCLUSION

The level of toxicity of the cythion and dieldrine to non-target animal like earthworm differed with the classification of chemical. In this present study, effects of two selected pesticides on survival and biomass were observed by acute toxicity test method. It was a short duration test. The duration and dose (for cythion 3, 6, 9, 12, and 15 mg/kg soil and for dieldrine 4, 8, 12, 16 and 20 mg/kg soil) of intoxication were 14th days and experiment was set at the different days time intervals such as 2, 4, 6, 8, 10 and 14th days. At the end of experimental results were taken. The result of the present study for cythion determined that there was no change in survival rate of earthworm from 2 to 14 days at 3mg/kg to 12 mg/kg soil of cythion, it was found that the effect was non-significant as compared to the control but there was no change in survival rate of earthworm from 2 to 10 days at 15mg/kg soil of cythion and at 14 days of intoxication period showed slightly change in rate of survival in earthworm, it was found that the effect was non significant as compare to the control.

VII. IMPLICATION AND RECOMMENDATION

The most modern technology was developed for the cultivation of the land. Pesticides have been one of the major components of modern agriculture. Many pesticides are extremely toxic to mammals and non target organism. The extent of hazard depends on the amount of residue and toxicity. The persistence and extreme stability of pesticides in the environment are the ultimate source of contamination at the dietary level. But only 50 years of pesticide use has raised many questions related to the non target animals and fertility of land. Pesticides, insecticides and herbicides certainly increase the food production, which has adverse effects on the non target animal like an earthworm. They are badly affected and consequently soil fertility and food production decreases.

The continuous use of pesticide has posed in a serious threat to the environment and resulted in the direct and indirect effects on non-target organism, soil fertility and production with the advent of chemical pest control, however earthworm has become non-target recipient of many pesticides. Some of the most effective pesticide is broad spectrum in action and they may indirectly harm earthworm and other beneficial organism.

A component of the soil plays an important role in the maintenance of soil productivity and improving physical condition of soil for sustainable and better plant growth. An earthworm is a farmer friend. Reduction in the number of earthworms has a detrimental effect on both physical and chemical properties of soil. Therefore, to maintain good soil structure capable of sustaining optimum plant growth, attempts should be made to reduce the application of pesticides known to adversely affect earthworm population.

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VIII. REFRENCE

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