EFFECTS OF HEAVY METAL EXPOSURE ON THE EARTHWORM EISENIA FETIDA (SAVIGNY, 1826) AND VERMICOMPOSTING EFFICIENCY

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Abstract

Heavy metal contamination in organic wastes presents critical environmental challenge, making sustainable methods essential. Vermicomposting utilizing the earthworm *Eisenia fetida*, is an environmentally sound strategy for transforming these wastes, however, the potential for bioaccumulation of toxic elements within the earthworms is a major concern that can comprise both the process efficiency and the safety of the final product. This study investigates the bioaccumulation of heavy metals in Eisenia fetida using Atomic Absorption Spectrometer (AAS) of earthworm samples. Twelve 10Kg capacity bins each containing 2 kg of cow dung slurry and 1 kg teak leaves (2:1) were used for the experiment. Four different treatments, (T1, T2, T3 and T4) such as Control, Captan, Mancozeb and Chlorothalonil respectively. Total of 100 earthworms were carefully weighted and released into each treatment. The treatments were arranged in Completely Randomized Design (CRD) and collected data were subjected ANOVA and DMRT mean separation using SAS 9.4 version. Weights of earthworm were recorded every 14 days for 45 days. Earthworm samples were collected from each treatment and subjected to AAS analysis to quantify the bioaccumulated heavy metals. The initial mean weight across the treatments was 2.17 ± 0.12 g. After 10 weeks, the control group (T1) showed a significant increase in biomass of 29 ± 0.08% [2.80 ± 0.08 g], whereas T2 (5 g MPs) exhibited a decrease in biomass of 12 ± 0.10% [1.97 ± 0.11 g] at P = 0.05. In contrast, T3 (10 g MPs) and T4 (50 g MPs) treatments showed highly significant weight loss, with average biomass reductions of 17 ± 0.09% [1.92 ± 0.10 g] and 24 ± 0.11% [1.72 ± 0.09 g], respectively, compared to the initial body weight at P = 0.0[illegible] study also revealed that the earthworm guts, which were treated with Captan, had accumulation of 0[illegible]g/L of Pb.

Keywords

Vermicomposting; Eisenia fetida; H[illegible]tal; Bioaccumulation