

Environmental Toxicology 2018: Toxicological studies on the impact of chlorpyrifos, cypermethrin and their combination in earthworm, *Eudrilus eugeniae* and their effect on Acetylcholinesterase (AChE) activity

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ABSTRACT

The increasing applications of pesticides in the agricultural fields have adverse impact on flora and fauna of the soil ecosystem. The role of earthworms in the agricultural practices is well known as they immensely contribute in increasing the quality and fertility of soil. So, it acts as a bioindicator for the ecotoxicological analysis of pesticide induced soil pollution. Therefore, the present study was aimed to explore the impact of chlorpyrifos (an organophosphate; OP) and cypermethrin (a pyrethroid) on earthworm, *Eudrilus eugeniae*. *E. eugeniae* were exposed to different concentrations of pesticides for 48 h by paper contact toxicity method. The LC50 for commercial grade chlorpyrifos and cypermethrin were determined as 0.165 µg/cm² and 0.020 µg/cm², respectively. To assess the sub-lethal effect of these pesticides, *E. eugeniae* were exposed to 5% and 10% of LC50 chlorpyrifos and cypermethrin for 48 h. Alterations in morpho-behavioural patterns such as coiling, clitellar swelling, mucus release, and bleeding followed by fragmentation of body in earthworms were observed following exposure. Acetylcholinesterase (AChE) activity was assayed in different regions of body segment which exhibits significant ($p < 0.05$) decrease in AChE activity particularly in pre-clitellar region followed by clitellar and post clitellar regions and in comparison, to whole body. The decreased AChE activity with increasing concentration of pesticides indicates the effect at neuronal level which apparent from the behavioural changes. Therefore, from the present findings it can be concluded that long term exposure to these pesticides could lead to severe and irreparable effects on biochemical mechanisms of earthworms. Chromium is one of the major soil pollutants, but its toxicity in soilorganism is less studied. So among the various metals that contaminate terrestrial ecosystems, Copper, chromium and Lead were chosen to be used in this study. The toxicity of chromium in soil organisms is less studied. The effects of the mixture of Insecticide and heavy metal on soil fauna is even less.

Earthworm is well studied as a model for heavy metal toxicity. There were many literatures concerned with metal uptake and accumulation in earthworms. Much of them measured metal content, growth, worms density Pizl accumulation rate Vijver and excretion rate Lock.

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