

**STUDY ON ADSORPTION AND TOXICOLOGICAL
IMPACT OF CHLORPYRIFOS PESTICIDE TO
THE AQUATIC INVERTEBRATES**

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by

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ABSTRACT

Pesticides have been misused and overused highly in the agricultural sector of Sri Lanka over the years and their intensive usage cause the contamination of water. Chlorpyrifos is a highly toxic organo-phosphorous insecticide and its fate and mobility are influenced by volatilization, leaching, adsorption, and degradation. This research study is based on the adsorption process. To monitor the cumulative effects of pesticides in the aquatic environment, *Daphnia magna* and *Moina* species are used as bio indicators. The objectives of this study are to determine the adsorption of Chlorpyrifos to the different soils and sediments, and to determine the LC 50 values of *Daphnia magna* and *Moina* species.

Soil samples were obtained from selected locations in upper Mahaweli catchment. Total organic carbon content of soil samples was determined. Known concentrations of Chlorpyrifos solutions were added separately to every soil sample and shaken the samples for Chlorpyrifos adsorption. Solid phase extraction was done to the non-adsorb Chlorpyrifos layers and, determine the non-adsorb concentrations using gas chromatography. Non-adsorb Chlorpyrifos concentrations were exposed to the *Daphnia magna* and *Moina* species according to the OECD procedures and calculate the LC 50 values for 48 hours. To determine the relationship between total organic carbon content and adsorption, correlation was done. Two- way ANOVA tests were done to determine the variance of mortality percentages of *Daphnia magna* and *Moina* species with concentration and time. Manually created graphs were used to determine the LC 50 values of *Daphnia magna* and *Moina* species.

There was a positive correlation between total organic carbon content and adsorption. Chlorpyrifos was strongly adsorbed to the soil and, when the organic matter content in soils is increased, adsorption increased significantly. There was a significant difference in mortality percentage of *Daphnia magna* and *Moina* species with concentration and time of exposure. Highest LC 50 value of both *Daphnia magna* and *Moina* species were recorded from soil 3 and lowest LC 50 value of both *Daphnia magna* and *Moina* species were recorded from soil 4. Adsorption of Chlorpyrifos to the soil reduced the toxicity level for *Daphnia magna* and *Moina* species. Further research on pesticide adsorption, pesticide behavior and their toxicity are necessary and important.