



Effect of organic amendments and derived dissolved organic matter on sorption and leaching of chlorpyrifos pesticide

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Incorporation of organic amendments (OAs) and organic waste recycling are common practices of soil carbon enrichment. Dissolved organic matter (DOM) derived from these organic amendments may, however, facilitate pesticide movement through soils. DOM was extracted from these organic amendments and characterized. Batch sorption and desorption experiments were carried out to evaluate the effects of organic amendments, mixed waste compost and dried goat manure and DOM derived from them on sorption of chlorpyrifos pesticide on an agricultural soil from India. Column leaching experiments were also performed under variably saturated conditions to understand the leaching potential of the pesticide with and without organic amendments. The column data was simulated using developed one-dimensional advection-dispersion-sorption model. It was observed that the addition of organic amendments significantly improved the soil organic carbon and hence increased chlorpyrifos sorption. The effects of DOM extracted from both the OAs significantly reduced chlorpyrifos sorption and was mainly governed by the nature of DOM. The study highlighted that although the net effect of OA application was an increase in chlorpyrifos sorption, interactions between the soil, chlorpyrifos and DOM from OAs led to a significant reduction in the sites available for chlorpyrifos sorption to an extent that depended on the nature of the DOM. These results suggest that interaction of soil surfaces and pesticides with the organic amendments and their derived DOM determine sorption characteristics and hence the transport of pesticide such as chlorpyrifos.