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Environmental Toxicology and Chemistry

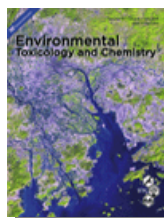
Environmental Toxicology

Effects of predator cues on pesticide toxicity: Toward an understanding of the mechanism of the interaction

Guangqiu Qin, Steven M. Presley, Todd A. Anderson, Weimin Gao, Jonathan D. Maul

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Environmental Toxicology and Chemistry

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Abstract

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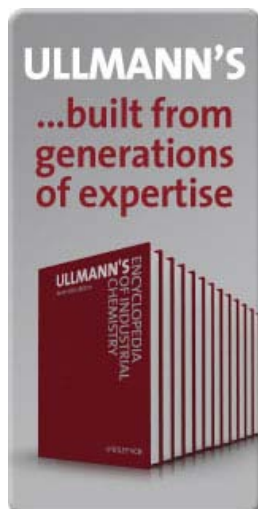
Ceriodaphnia dubia; Mixture effects; Multiple stressors; Non-additive interactions; Predator cues

Abstract

Pesticide toxicity may be modified by a number of co-occurring environmental and ecological stressors. Co-exposure to predator cues has been shown to potentiate and/or synergize toxicity of pesticides. However, the mechanisms behind these interactions are not well understood. Here we examine the effects of fish predator (bluegill, *Lepomis macrochirus*) cues on toxicity of five different pesticides to the freshwater cladoceran, *Ceriodaphnia dubia*. The purpose for examining patterns among pesticides was to test the idea that the mechanism of the interaction could be explained by a general stress response (i.e., the interaction patterns would be similar regardless of the pesticide's mechanism of action [MOA]). Acute 96-h concentration-response experiments were conducted for pesticides with and without fish cues. Predator cues influenced the toxicity of pesticides and the interaction patterns varied among pesticides. Fipronil exhibited a synergistic interaction, while predator cues interacted antagonistically for bifenthrin and thiacloprid. Other compounds previously reported to potentiate toxicity (malathion) were found to act additively. The results demonstrate that factors such as pesticide bioavailability, K_{OC} , and exposure concentration may be important for predicting the occurrence of these interactions and that patterns were not consistent among pesticides varying in MOA. Predator stress is an important component for structuring communities and ecosystem processes. Fully understanding how this process may interact with organic contaminants may best be achieved by examination at toxicokinetic and toxicodynamic scales.

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