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INCREASED TOXICITY TO INVERTEBRATES ASSOCIATED WITH A MIXTURE OF ATRAZINE AND ORGANOPHOSPHATE INSECTICIDES

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Abstract—This study examined the joint toxicity of atrazine and three organophosphate (OP) insecticides (chlorpyrifos, methyl parathion, and diazinon) exposed to *Hyalella azteca* and *Musca domestica*. A factorial design was used to evaluate the toxicity of binary mixtures in which the lethal concentration/lethal dose (LC1/LD1, LC5/LD5, LC15/LD15, and LC50/LD50) of each OP was combined with atrazine concentrations of 0, 10, 40, 80, and 200 g/L for *H. azteca* and 0, 200, and 2,000 ng/mg for *M. domestica*. Atrazine concentrations (40 g/L) in combination with each OP caused a significant increase in toxicity to *H. azteca* compared with the OPs dosed individually. Acetylcholinesterase (AChE) activity also was examined for the individual OPs with and without atrazine treatment. Atrazine in combination with each of the OPs resulted in a significant decrease in AChE activity compared with the OPs dosed individually. In addition, *H. azteca* that were pretreated with atrazine (40 g/L) were much more sensitive to the OP insecticides compared with *H. azteca* that were not pretreated with atrazine before being tested. Topical exposure to atrazine concentrations did not significantly increase OP toxicity to *M. domestica*. The results of this study indicate the potential for increased toxicity in organisms exposed to environmental mixtures.

Keywords—Atrazine Organophosphates Acetylcholinesterase *Hyalella azteca Musca domestica*