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What Doesn't Kill You Makes You Sluggish: How Sublethal Pesticides Alter Predator–Prey Interactions

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What Doesn't Kill You Makes You Sluggish: How Sublethal Pesticides Alter Predator–Prey Interactions

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Abstract

Pesticides commonly occur in ecological communities at relatively low concentrations, leading to growing interest in determining the sublethal effects of pesticides. Such effects should affect individuals and, in turn, alter interspecific interactions. We sought to determine how sublethal concentrations (0.1 and 1.0 mg/L) of two common pesticides (carbaryl and malathion) affected predator and prey behavior as well as subsequent predation rates. We conducted a series of experiments using three species of larval amphibians (Gray Treefrogs, *Hyla versicolor*; Green Frogs, *Rana clamitans*; and American Bullfrogs, *R. catesbeiana*) and three species of their predators (larval dragonflies, *Anax junius*; adult water bugs, *Belostoma flumineum*; and adult Red-spotted Newts, *Notophthalmus viridescens*). We found that the pesticides frequently reduced the activity of all three tadpole species. For the two invertebrate predators (*Anax* and *Belostoma*), the pesticides were lethal, precluding us from examining sublethal effects on predator–prey interactions. However, newt survival was high and the addition of the pesticides reduced the predation rates of newts in one of the three tadpole species. There were no effects of the pesticides on the striking frequency of the newts or on their prey capture efficiency. Thus, the mechanism underlying the pesticide-induced reduction in predation rates remains unclear. What is clear is that sublethal concentrations of pesticides have the potential to alter prey behavior and species interactions and thereby alter the composition of ecological communities.

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