

Interaction between insecticide exposure and trematode infection across four wood frog populations

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ABSTRACT

Amphibian populations are declining worldwide due to a number of stressors including pesticides and parasites. Conservation of these animals can be complicated because populations can differ dramatically in response to the same stressor. When consistently exposed to pesticides, some populations evolve tolerance through the process of natural selection acting across multiple generations. Alternatively, populations that are intermittently exposed to pesticides induce tolerance within a single generation. To date, however, there have been few studies examining the costs associated with these different stress tolerance mechanisms. In this study, we examined how difference in stress tolerance influence susceptibility to parasitic infections. We collected wood frog tadpoles from four different populations: two with evolved tolerance to pesticides and two with the ability to induce pesticide tolerance. We exposed tadpoles from each population to sublethal doses of carbaryl (0 and 5 ppm) for 5 days. Tadpoles were allowed to acclimate in pesticide-free water for 2 days. After this acclimation period, we then exposed tadpoles to 0 or 50 trematode parasites (*Echinostoma trivolvis*) for 2 days and counted the number of parasites encysted within the body. Exposure to sublethal carbaryl decreased susceptibility to trematodes for tadpole populations with evolved pesticide tolerance. In contrast, exposure to sublethal carbaryl increased susceptibility to trematodes for tadpole populations with induced pesticide tolerance. This suggests that populations with the ability to induce pesticide tolerance incur the cost of increased disease risk. This has important conservation implications for understanding a population's history and defending against disease.

KEYWORDS

Carbaryl, *Lithobates sylvaticus*, *Echinostoma trivolvis*, ecotoxicology, disease ecology

REFERENCES

Hua, Jessica, Nathan I. Morehouse, and Rick Relyea. "Pesticide tolerance in amphibians: induced tolerance in susceptible populations, constitutive tolerance in tolerant populations." *Evolutionary applications* 6.7 (2013): 1028-1040.

Bridges, C. M., and R. D. Semlitsch. 2000. Variation in pesticide tolerance of tadpoles among and within species of Ranidae and patterns of amphibian decline. *Conserv Biol* 14:1490-1499.