# Butterflies fall victim to mosquito control

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Common buckeye butterfly Credit: inf0junction.blogspot.com

South Florida's butterflies have become the unintended victim of insecticide control, according to FIU researchers.

A five-year study by scientists in the FIU Ecotoxicology and Risk Assessment Lab has found that exposure to naled, permethrin and dichlorvos—insecticides sprayed loyally for mosquito control—are acutely toxic with some species being more sensitive than others.

"Changes in butterfly populations that occur as a result of natural factors are difficult to control and manage," said Gary Rand, director of the Ecotoxicology and Risk Assessment Lab and professor of environmental studies. "Human factors, like our use of insecticides, can certainly be monitored and managed more effectively."

Researchers studied the abundance and diversity of butterfly populations, including common buckeye, white peacock and atala hairstreak. The butterflies were most directly affected by insecticides sprayed in the air and ground, but they were also significantly exposed to the chemicals by eating contaminated plant leaves as caterpillars. The researchers found naled was most acutely toxic when ingested. The studies were funded by the U.S. Fish and Wildlife Service and were published in *Environmental Toxicology and Chemistry*; *Science of the Total Environment*; and *Chemosphere*.

"These results are based only on ingestion and single chemical doses," Rand said. "It doesn't include other typical exposure scenarios that may occur in the environment, where the organisms may be exposed via environmental drift and to multiple or continuous exposures."

The Environmental Protection Agency (EPA) lists the insecticides naled, permethrin and dichlorvos as highly toxic to aquatic organisms and honeybees and relies on honeybees to test the effects of insecticides on unintended targets. According to the researchers, butterflies, with their much larger surface areas, are at greater risk of exposure than the smaller honeybee. They recommend using butterflies as potential test organisms when testing the effects of pesticides on non-target organisms.

**More information:** "Use of butterflies as nontarget insect test species and the acute toxicity and hazard of mosquito control insecticides." *Environmental Toxicology and Chemistry*, 30: 997–1005.
doi: 10.1002/etc.462

"Mosquito control insecticides: A probabilistic ecological risk assessment on drift exposures of naled, dichlorvos (naled metabolite) and permethrin to adult butterflies," *Science of The Total Environment*, Volume 502, 1 January 2015, Pages 252-265, ISSN 0048-9697, dx.doi.org/10.1016/j.scitotenv.2014.09.027

"Acute toxicity and risk assessment of permethrin, naled, and dichlorvos to larval butterflies via ingestion of contaminated foliage," *Chemosphere*, Volume 120, February 2015, Pages 714-721, ISSN 0045-6535, dx.doi.org/10.1016/j.chemosphere.2014.10.040

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