Global warming may affect pesticide effectiveness

November 30 2015

The effectiveness of an important mosquito-fighting insecticide may be impaired by global warming, according to a recent study in the *Journal of Medical Entomology*. Two researchers from Montana State University, graduate student Shavonn Whiten and Dr. Robert Peterson, have shown that permethrin becomes less effective at killing the yellowfever mosquito (*Aedes aegypti*) as temperatures increase.

These mosquitoes, which are found in the tropics and the subtropics, can transmit viruses that lead to dengue, chikungunya, yellow fever, and other diseases.

"Many of the areas where these insecticides are employed have varying drastic temperature changes," Whiten said.

In their lab study, the researchers exposed adult mosquitoes to varying concentrations of permethrin at a range of temperatures. They found an inverse relationship between death and temperature from 16 °C to 30 °C, which showed the highest negative correlation. From 30 to 32, there was, however, a positive correlation between mortality and temperature. And from 32 to 34, the negative correlation resumed.

"It probably has something to do with variability and heat stress," said Peterson. "Once you get to those higher temperatures, there are other things going on regarding stress on the mosquito that cancel out the effect of the pyrethroids (a class of pesticides to which permethrin belongs) working better at lower temperatures and worse at higher

temperatures."

Some possible reasons: 1) Lower temperatures may make the mosquito neurons more sensitive to permethrin, which is a neurotoxin. 2) The permethrin may persist longer and remain active at lower temperatures. 3) Lower temperatures may enhance the ability of the insecticide to bind to its target site.

People involved in mosquito-control efforts should take temperature into account when choosing a pest-control product, according to Peterson.

"If we are applying at higher and higher ambient temperatures, we could have a reduction in control," he said. "Therefore you need to pick something that's going to be efficient and not be a waste of time and money in controlling mosquitoes."

More information: "The Influence of Ambient Temperature on the Susceptibility of Aedes aegypti (Diptera: Culicidae) to the Pyrethroid Insecticide Permethrin," *Journal of Medical Entomology*, dx.doi.org/10.1093/jme/tjv1590

Provided by Entomological Society of America

Citation: Global warming may affect pesticide effectiveness (2015, November 30) retrieved 15 August 2024 from https://phys.org/news/2015-11-global-affect-pesticide-effectiveness.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.