Global warming may affect pesticide effectiveness
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The effectiveness of an important mosquito-fighting target site.
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

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,
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