TIEHH RESEARCHER STUDYING ZIKA-TRANSMITTING MOSQUITOES' RESISTANCE TO COMMONLY USED INSECTICIDES

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By: Glenys Young

All participating counties will receive individualized results.

Steve Presley

Steve Presley, a professor in The Institute of Environmental and Human Health (TIEHH) at Texas Tech University and director of the Biological Threat Research Lab, says there will almost certainly be an outbreak of Zika virus this year.

"I don't know if it will be in Texas; there probably will be isolated areas where there are outbreaks," he said. "I wouldn't even hazard to try to predict how many we'll see or how bad it'll be. The potential is there, though. We know that."

With that in mind, Presley is preparing to launch an important statewide research project funded by a $200,000 public health grant from the Texas Department of State Health Services. The goal is to study the effectiveness of insecticides used throughout the state against the two mosquito species that transmit Zika virus and other diseases.

"The key thing, and the objective of the research, is to find out if we

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can kill them," Presley said. "If there is a big Zika outbreak, or Dengue fever, or Chikungunya virus, can we kill them, can we control it? It's a very basic research question: Are the mosquitoes resistant or susceptible to these pesticides they've been exposed to?"

Presley – who testified about the Zika epidemic before the U.S. House of Representatives Committee on Science, Space and Technology in May 2016 – was part of a working group of academic and industry experts in mosquito control, biology and disease transmission that began work last year to determine where the *Aedes aegypti* and *Aedes albopictus* could survive. Their results showed the species much farther north than expected.

Aedes aegypti

This year's effort will study whether the species have developed resistance to the insecticides used to control them in 48 Texas counties, ranging from Amarillo to Brownsville and El Paso to Port Arthur. The work will result in a focused, individualized plan for each county to best combat the threat of Zika virus.

Aedes albopictus

Presley's lab will send each participating county an Ovitrap, which is used to collect the eggs of the two targeted species. Once a month, each county will collect a week's worth of eggs from the trap and mail them to Presley, who will then rear the eggs to adulthood in TIEHH's insectary. After identifying the mosquitoes as belonging to one of the target species, Presley will test whether they are resistant to a range of insecticides.

The process, called a bottle bioassay, involves treating the inside surfaces of a Wheaton jar with a specific concentration of the insecticide being tested.

"Then you put 10 or 20 adult mosquitoes in that jar, put a lid on it and leave them," Presley said. "You check 30 minutes later, an hour later, two hours later, four hours later, to determine how long it takes them to die at that specific concentration.

The Institute of Environmental and Human Health was created in 1997 as a j venture between Texa Tech and the Texas T University Health Sciences Center to assess the impact of toxic chemicals and diseases on the physi and human environments, includi air, water, soil and animal life.

Researchers investiga elements in the envir both those that are na occurring such as dis and those caused by humans, such as nucl activity, pollution or chemical or bioterrori

which negatively impa environment. It is one few labs in the countr dedicated to environm toxicology.

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"We'll know what insecticides they're using commonly where the mosquitoes come from, but we'll test them against a whole range of public health insecticides to determine what is effective and what's not effective."

Across the state, pyrethroid, synthetic pyrethroid or synthetic permethrin insecticides are commonly used because they're safe for use around people. The trouble with *Aedes aegypti* and *Aedes albopictus* is that they are less likely to be affected by traditional mosquito-control methods.

(VIDEO) In 2016, Steve Presley spoke to U.S. representatives about his labs' Zika-related work and his role on the task force for the State of Texas response to Zika and public health protection. Full Story>>

"Those two species aren't like the normal mosquitoes we see at dusk and dawn that transmit West Nile Virus or Saint Louis encephalitis virus," Presley said. "These *Aedes* species are daytime biters, and they like to be in the house, and they like to live in the backyard. They aren't out flying around at dusk and dawn getting that full dosage when they drive up and down the street spraying for mosquitoes, but they might get a little, so some of them survive and that's one way resistance develops.

"It's pretty likely that there will be some resistance realized."

Public health recommendations encourage counties to change insecticides every few years specifically for that reason, but it doesn't always happen, Presley said.

"I know of several jurisdictions in this region that have used the same product for 10 years and have never switched," he said. "Insects develop resistance and so that resistance will be specific to the area we're testing. We'll know what insecticide they use and we'll target their results based on that."

From a public health perspective, this research is vital. Only 2-3 percent of the people who are infected with Zika virus ever show symptoms – most never know they have the virus.

"If somebody moves into the neighborhood and is asymptomatic, the mosquitoes in the neighborhood could pick it up from them and infect other people who would be symptomatic, and an outbreak could begin," Presley said. "With microcephaly and birth deformities and Guillain-Barré Syndrome, we're finding out more about the virus all

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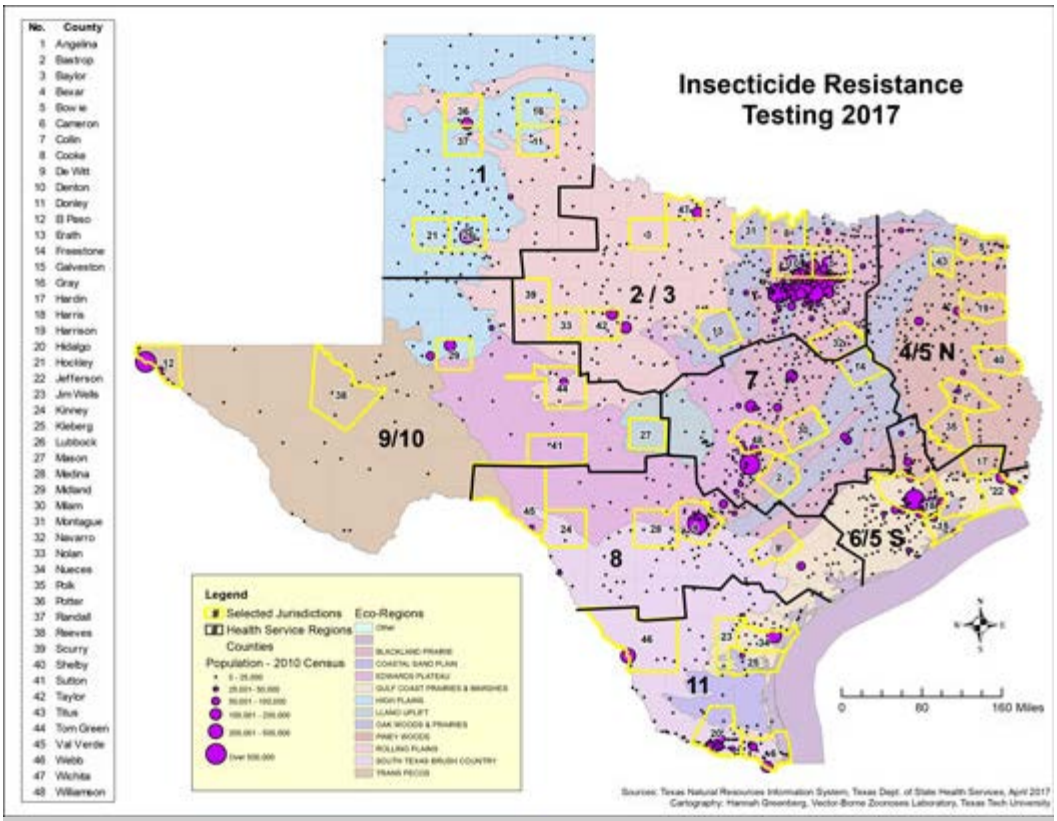
the time. It has a lot of tricks up its sleeve, and we may find out more this year.

"As far as what Brazil experienced last year, I don't think we will ever get to that point because most Americans have air-conditioning and window screens. If you can keep the mosquitoes out of your house and limit exposure, it lessens your likelihood of getting bitten. With Zika virus in particular, there's a lot we don't know about how the virus acts and where it goes in the body, but we'll learn. The virus is constantly mutating, so the virus that occurred in Brazil is different to some degree than what we'll see here."



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Counties that may be included in the research are:

- **Angelina**
- **Bastrop**
- **Baylor**
- **Bexar**
- **Bowie**
- **Cameron**
- **Collin**
- **Cooke**
- **De Witt**
- **Denton**
- **Donley**
- **El Paso**

- Erath
- Freestone
- Galveston
- Gray
- Hardin
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