

Insecticide resistance genes affect vector competence for West Nile virus

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Collecting method of the *Culex quinquefasciatus* larvae. Credit: (c) Institut Pasteur

Overuse of insecticides, which leads to the selection of resistant mosquitoes, affects interactions between mosquitoes and the pathogens they transmit. Researchers from the Institut Pasteur (Paris) and its partners have now shown that mechanisms of insecticide resistance, observed in *Culex quinquefasciatus* vector, impact the transmission of

West Nile virus.

In recent decades, arthropod-borne viruses (arboviruses) that affect [human health](#) such as dengue, chikungunya, Zika or West Nile viruses have caused epidemic outbreaks or even pandemics affecting global populations. In the absence of vaccines and therapeutic treatments, the control of arboviruses relies mainly on the control of mosquito populations.

The use of insecticides has long been a favored method to reduce mosquito densities and thus interrupt the transmission of arboviruses. However, the overuse of insecticides leads to the selection of [mosquitoes](#) with insecticide resistance genes. Insecticide resistance has been reported to affect interactions between mosquitoes and the pathogens they transmit.

"We provide the first evidence of the impact of two main mechanisms of insecticide resistance on arbovirus transmission," says Anna-Bella Failloux, Head of the Arboviruses and Insect Vectors laboratory at the Institut Pasteur.

"Using experimental infections, we compared the vector competence of insecticide-resistant and -susceptible *Culex quinquefasciatus* mosquitoes (target modification and overproduction of detoxification enzymes) to two arboviruses, Rift Valley fever [virus](#) (RVFV) and West Nile Virus (WNV)." For RVFV, vector competence remains unchanged whether the mosquito is resistant or susceptible. However, resistant mosquitoes transmit better WNV than susceptible mosquitoes.

"Our results underscore the importance of understanding the effects of insecticide [resistance](#) on vector competence and require reconsidering vector control strategies by limiting the production of [insecticide](#)-resistant mosquitoes."

More information: Célestine M. Atyame et al, Insecticide resistance genes affect *Culex quinquefasciatus* vector competence for West Nile virus, *Proceedings of the Royal Society B: Biological Sciences* (2019).

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