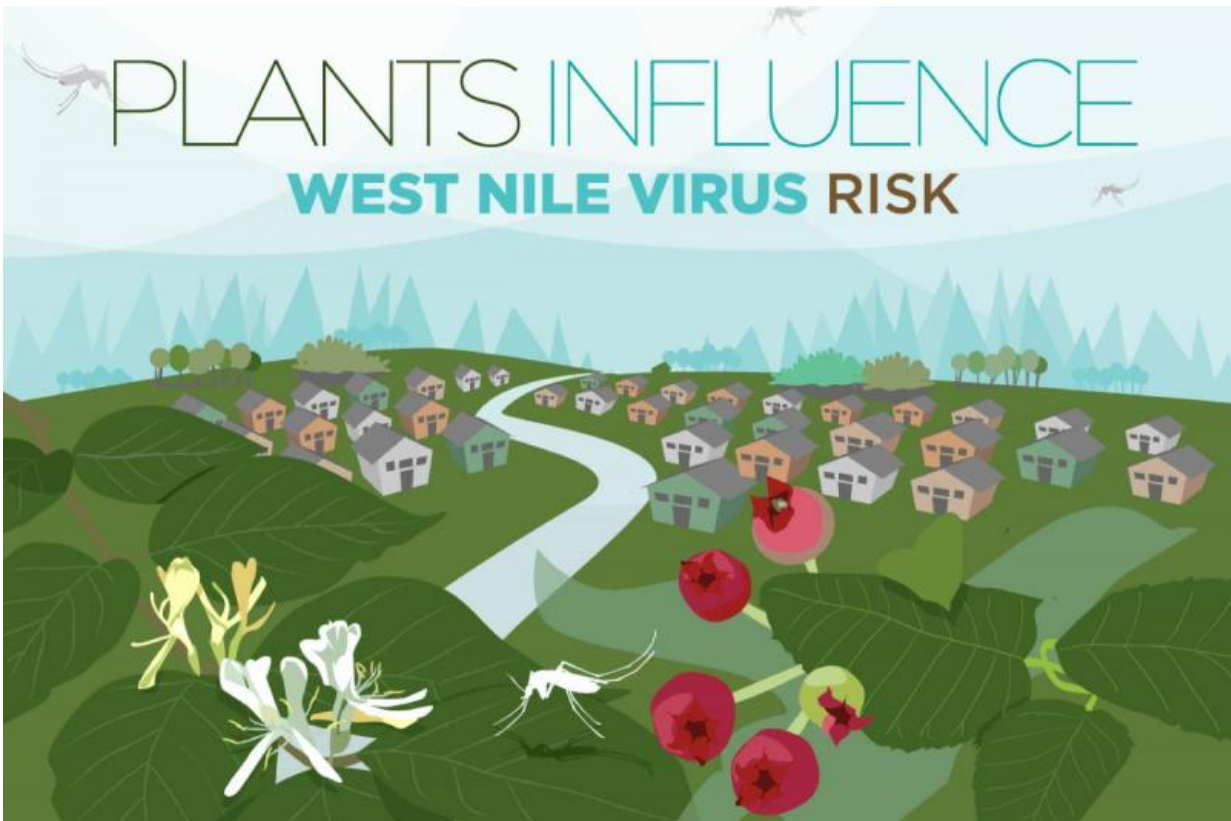


# What's in your landscape? Plants can alter West Nile virus risk

July 1 2015

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Some invasive, non-native plants enhanced *Culex pipiens* mosquito abundance, increasing the risk of West Nile virus transmission. Some native plants had the opposite effect, researchers found. Credit: Julie McMahon

A new study looks at how leaf litter in water influences the abundance of *Culex pipiens* mosquitoes, which can transmit West Nile virus to humans,

domestic animals, birds and other wildlife.

The study found that different species of [leaf litter](#) in standing water influence where *Culex pipiens* [mosquitoes](#) deposit their eggs, how quickly the larvae grow, how big they get and whether they survive to adulthood. Because the mosquitoes feed on bacteria that grow on leaf litter, the team also measured how native and non-native leaf species influenced bacterial abundance and diversity.

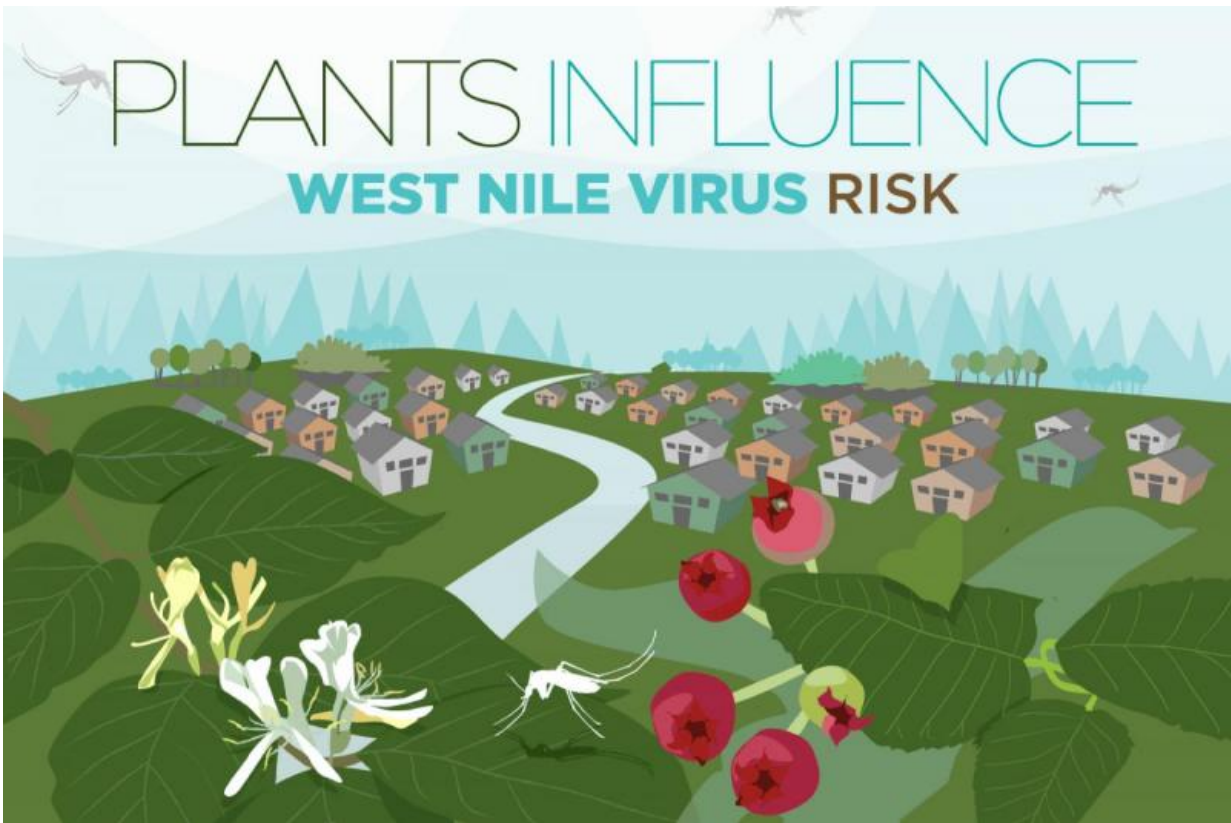
The study is [reported](#) in the journal *Parasites and Vectors*.

When added to standing water, the leaves of two non-native, invasive plants, Amur honeysuckle (*Lonicera maackii*) and autumn olive (*Elaeagnus umbellata*), yielded significantly higher numbers of adult mosquitoes than other leaf species did, the researchers report.

"The invasive honeysuckle was definitely the highest quality habitat in terms of the adult mosquito emergence rates, even when you had very high densities of the larvae," said graduate student Allison Gardner, who led the research with University of Illinois entomology professor Brian Allan and Illinois Natural History Survey entomologist Ephantus Muturi. The INHS is a division of the Prairie Research Institute at the U. of I.

A third invasive plant, multiflora rose (*Rosa multiflora*) was associated with low numbers of eggs laid and low survival of the larvae, the researchers found.

The team also made an unexpected, but promising, discovery: One of the plants studied, a native blackberry (*Rubus allegheniensis*), seemed to encourage *Culex pipiens* mosquitoes to deposit a lot of eggs on the water's surface - but very few of the resulting larvae survived to adulthood.



Researchers, from left, Ephantus Muturi, Allison Gardner and Brian Allan found that different types of leaf litter in water had different effects on the abundance of *Culex pipiens* mosquitoes, which can carry West Nile virus. Credit: L. Brian Stauffer

"The blackberry was one of the most attractive habitats to the mosquitoes, but also one of the lowest quality habitats in terms of the larval survival rate," Gardner said.

"Blackberry was a really poor habitat: It took the larvae a long time to develop and the adult mosquitoes that eventually emerged were small," Allan said. "What's exciting about this is that it suggests that blackberry functions as a kind of ecological trap, enticing mosquitoes to lay their

eggs in a place where the larvae are unlikely to survive."

This finding could lead to new, biological methods of controlling *Culex pipiens* mosquitoes, he said.

Two other native plants, elderberry (*Sambucus canadensis*) and serviceberry (*Amelanchier laevis*), had different effects on the mosquitoes. Elderberry attracted mosquitoes looking for a place to lay their eggs, and the larval survival rates were low, but not as low as for blackberry. The mosquitoes deposited the lowest number of eggs in water infused with serviceberry leaves, but the survival of the larvae was a fairly robust, 62 percent. ([See graphic.](#))

The team also analyzed the bacteria that colonized the different leaf types.

"We wanted to understand the mechanism by which plants differ in their ability to support mosquito oviposition, development and survival," Muturi said.

Sites with more bacterial diversity had higher numbers of mosquito eggs than those with less diversity, the researchers found. But bacterial abundance, not diversity, was associated with better larval survival.

This finding could explain the unexpected role of blackberry leaves as an ecological trap, Muturi said. Blackberry leaf debris in water hosted a high diversity of bacterial species, but bacterial abundance was rather low, giving the developing larvae little sustenance.

"If you are a mother, you want your kids to develop in an area that has more resources, more food to eat," Muturi said. "But sometimes a mother makes a mistake and chooses the wrong habitat. An ecological trap is a mismatch between the choice that the mother makes and the

quality of the habitat."

Future studies will explore whether [blackberry](#) leaves can be used to undermine the viability of disease-carrying mosquitoes, Allan said.

In the meantime, those working to stop the advance of invasive plants like honeysuckle and autumn olive have another reason to do so, Allan said.

"These are some of the most widespread invasive exotics in North America," he said. "Plants like honeysuckle are having very significant ecological impacts, displacing a lot of native species. And now we're seeing that some of them also enhance the transmission of a dangerous disease."

Provided by University of Illinois at Urbana-Champaign

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