

Nuisance vs. Vector Mosquitoes

Mosquitoes and Humans

Although we are all aware that mosquitoes exist, it might be surprising to learn that there are many different species of mosquitoes. Forty distinct species of mosquitoes have been recorded in South Dakota alone. Not all of these species have the same relationship with humans. The relationships can be broken down into two general categories: nuisance and vectors. Nuisance mosquitoes bite humans, but do not pose major health risks. Vector mosquitoes bite humans and can transmit disease, such as West Nile Virus (WNV).

1

NUISANCE

The most common mosquito in South Dakota, *Aedes vexans*, is primarily an annoyance to humans because it rarely carries West Nile virus (WNV). However, it can act as a vector for the parasite that causes heartworm in dogs.



2

VECTOR

A biological vector is a term for an animal that transmits disease from one organism to another. West Nile virus (WNV) can be transmitted by multiple species, but the principal vector of WNV in South Dakota is the species *Culex tarsalis*.



Identification:

To tell *Ae. vexans* from *Cx. tarsalis* look at the end of the mosquito's abdomen. *Ae. vexans*' abdomen is more pointed at the end, whereas *Cx. tarsalis*' abdomen is rounded.

Aedes species



Culex species

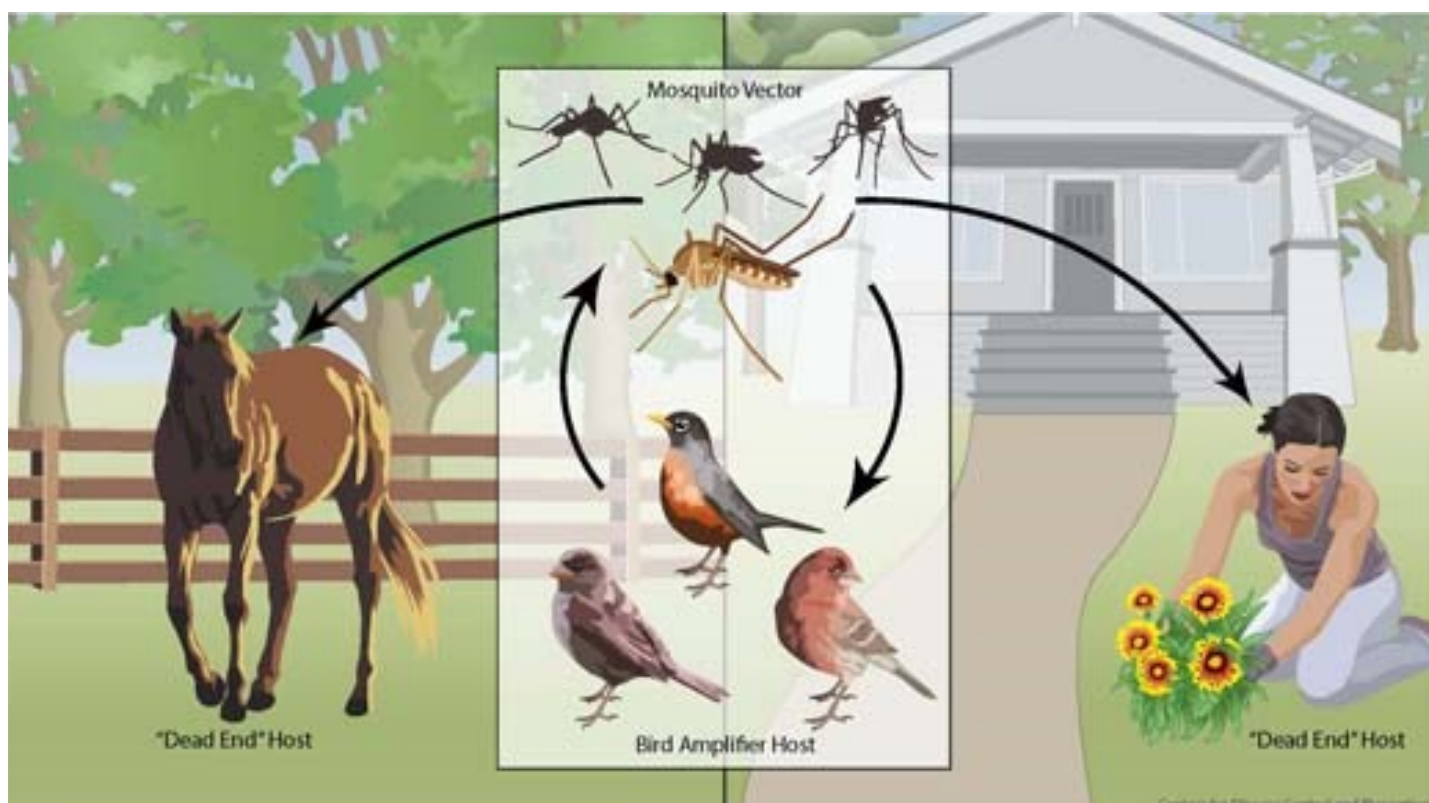


Differences Between Nuisance and Vector Biology

Reproductive strategies, life history, and habitat preference of the principal nuisance species, *Ae. vexans*, and vector species, *Cx. tarsalis*, are different. These differences in biology should be taken into account when considering mosquito control strategies.

Why is *Cx. tarsalis* a vector for West Nile virus?

West Nile virus usually circulates among birds and mosquitos (see picture below). Only birds infected with WNV can pass on the virus to a mosquito. Because *Ae. vexans* feeds primarily on mammals, it does not become infected by the virus through avian hosts. Early in the season *Cx. tarsalis* feeds primarily on birds, but then switches to birds and mammals during the summer. When *Cx. tarsalis* bites a bird infected with WNV, the virus multiplies within the mosquito and moves through its body until it reaches the salivary glands. At that point, the virus is able to be transmitted to a human through the mosquito bite



Larval habitat differences

Larval habitats of mosquitoes are as broad and complex as the mosquitoes themselves. *Aedes vexans* and *Cx. tarsalis* larval habitats can overlap, although they show higher correlations with slightly different habitats. They also have different reproductive biology, which relates to where they choose to lay their eggs.

Aedes vexans is called a flood water mosquito because

females lay eggs on exposed soil that will likely be flooded at some point during the season, like around the edges of semipermanent swamps or woodland pools. Eggs hatch after they become submerged, triggered by low levels of dissolved oxygen in the water. In South Dakota, this species is found in higher concentrations near wetlands. *Aedes vexans* larvae are found in a variety of habitats including ditches, areas in which streams or creeks have flooded over their banks, and flooded woodlands.

Culex tarsalis' contrasting strategy is to lay its eggs directly on the water surface in standing water that is nutrient rich, such as hoof prints or tire tracks in pastures, dugouts in cattle pastures, and pools created by irrigation runoff. In South Dakota, *Cx. tarsalis* is found in higher concentrations near fields with perennial grass cover, grazing and hay production lands.

Due to the difference in reproductive biology, the two species show different responses to precipitation events. *Aedes vexans* populations will increase 2 weeks after rains, whereas increases in *Cx. tarsalis* populations are not strongly correlated with rain events.

It should be noted that these two mosquito species, and all other species, are not necessarily limited to the previously described habitat types. Breeding sites can range from natural wetlands, to water filled tree holes, to artificial man-made containers and more. Visual confirmation of mosquito larvae is always recommended before treating with larvicide.



When are they a problem?

Aedes vexans overwinters as eggs and begins to emerge as early as May. Populations increase in size quickly. Hundreds of larvae can be found within a liter of water, and one generation can cycle through in 1 to 3 weeks depending on the temperature. In South Dakota, *Ae. vexans* can have two population peaks depending on timing and amounts of precipitation, one in late June or July and one in late fall. *Culex tarsalis* overwinters as adults. Its population emerges after *Ae. vexans*, and begins to increase during mid-June. The population peaks in July, and in Eastern South Dakota it typically never becomes as numerous as *Ae. vexans*.

Peak feeding hours also varies between the species. *Aedes vexans* feeds most intensely during dusk and evening hours. *Culex tarsalis* tends to feed later in the evening than *Ae. vexans*.

Control for Public Health

Although *Ae. vexans* is a noticeable pest, especially in the spring, it is relatively harmless to humans. The real health threat comes in July and August when numbers of *Cx. tarsalis* infected with WNV are typically at their highest. Mosquito control professionals should keep this in mind and save resources for control measures later in the summer in case they are needed.

To assist in mosquito control spraying decisions, the SD Mosquito Information System puts out weekly forecasts of WNV risk on the website, <http://mosquito.sdstate.edu>. For more information contact Dr. Michael C. Wimberly (michael.wimberly@sdstate.edu) or Dr. Michael B. Hildreth (michael.hildreth@sdstate.edu).

