

West Nile Virus prevention in Saskatchewan

By Paule Hjertaas, B Sc biology, and a founding member of CCHE

West Nile virus (WNV) prevention came up at the Nature Sask fall meet. When I got back to my chair, there was a little note from Ron Jensen telling me an article about WNV prevention in Nature Views would be useful, so here it is.

While the SK WNV human toll was high in 2003, it fell to only eight cases in 2004, which seemed to surprise everyone. This fits what is known of similar diseases such as St-Louis encephalitis, for which human cases are found every 11-13 years, when the level of immunity in the bird population is low enough that mosquitoes get infected. However, WNV is not over yet, and will likely never be totally over, so prevention is still a good idea.

The concern expressed at the meeting was that some municipalities were under the impression they could be held responsible for human cases of WNV if they did nothing to control mosquitoes. I don't know if they have been told that, or if they take it from some press releases from Ontario in 2003 where some people who got infected wanted to sue. The situation was different in Ontario because it was the first Canadian test case and the Ontario department of Health had apparently not done a very good job of educating people to the occurrence, prevention and risks of WNV. I am not sure what is happening with this law suit, but be aware that there is a legal opinion that citizens can sue for the opposite, to stop aerial spraying. (http://www.cche-info.com/pdf/cche--legal_opinion.pdf)

Saskatchewan experience

Sask Health, however, started on the right foot. I think we have one of the best human monitoring programs in North America, as shown by the fact that only 1 case out of 12 detected in 2003 was a serious complication of WNV, compared to 1 out of 2 or 3 everywhere else. Sask Health is also doing the right thing by having a knowledgeable mosquito biologist directing their monitoring and education program. Not only is Phil Curry a biologist, but he is seconded from Ducks Unlimited, so he knows the importance of marshes to wildlife and water conservation, and does not start from the point of view that draining everything in sight is the way to go. Essentially, Sask Health's approach is science-based, in the proper use of the term.

In 2003, Sask Health funded participating 108 willing communities 1:1 for their mosquito control efforts that followed their guidelines. For 2004, they were looking at changing the funding equation to give proportionately more to small communities as they need more financial support. This is a voluntary program. If you live in a small town, ensure that your municipality will be open to sign on to Sask Health's program which would provide them with training and information for appropriate mosquito control.

Phil's work confirmed that **not all mosquitoes species or individuals carry WNV**. Only a few species carry the virus and are good at amplifying in their gut, such as the two bird mosquitoes *Culex tarsalis* (*Ct*) and *Culex restuans* (*Cr*), and a new vector identified in 2003, *Culiseta inornata* (*Ci*), a mosquito that tends to bite small mammals. So far, the control efforts have been directed at both *Culex* species, as they are the most likely vector. In contrast, the main vector in Eastern North America is the mosquito species *Culex pipiens* (*Cp*). Because each species of mosquito has different habits and preferred habitats, a mosquito control strategy has to be regionally adapted. For instance, *Cp* breeds in sewers, necessitating their treatment with larvicide in eastern Canada, but our mosquitoes apparently don't breed there. Different species also appear at different times of year, and have different wintering habits.

The first step Phil takes when training mosquito control personnel in a municipality is to determine where mosquitoes are breeding in an area. He teaches trainees to use a dip net and identify mosquito larvae to species. I assume they then make a more permanent map that can be used as a reference from year to year. When looking for live food for my fish in the spring,

I had already noticed that, in many ponds and sloughs, you rarely find a mosquito larva, while in others, this is all you find. Similarly, many municipalities have only one major source of *Culex tarsalis* mosquitoes in their area. One example Phil gave was one municipality paying for aerial application of *Bti* on a 60 acre marsh, while all the mosquito larvae were found in the ditch leading to this marsh, which was not sprayed. No need to say this aerial spraying was a waste of time, money and product. The basic training approach taken at that time quickly identified the source of mosquitoes, and resulted in more effective and much cheaper control. Another example of effective mosquito control was to fill in a depression dug by water near a culvert.

Sask Health 2003 statistics showed that communities who larvicided with *Bacillus thuringiensis israeli* (*Bti*) as a first line of defense against mosquitoes had significantly less *Ct* mosquitoes than communities who did not, so larviciding seems to work for controlling *Ct*.

However, the results were not so obvious for *Cr*, because they tend to lay eggs in people's backyards, in birdbaths, badly draining gutters, chips bags, ornamental wells, old tires used for swings or in playgrounds, or planters and containers and other such stagnant water spots. What is needed for controlling that species is an educational effort at the municipal level to get rid of stagnant water on their land. Essentially, get rid of the extra junk, drill holes in the bottom of containers and tires used for playgrounds to drain water when it rains, change the water in bird baths once a week, more often if it is very warm, and keep your gutter clean and in good repair. Add fish or running water to your pond. Keep pet and livestock water dishes and troughs clean, emptying them regularly.

The last thing you want in and around your home and property is a junk yard. While an established marsh has lots of mosquito predators, a tire or chip bag has none. I keep wondering about the role in WNV infection of old car or machinery cemeteries near so many farms. Tire piles have been established as a definite and problematic breeding ground for *Culex restuans* across southern Saskatchewan. One of my friends suffered a severe case of WNV in 2003 and, when I stopped at their farm this spring, I noticed the yard filled with lots of abandoned toys, planters etc that could easily collect water. The livestock water trough looked to me like it would benefit from draining and cleaning regularly. It looked like an effective home-based mosquito breeding program was going on!

What is the difference between Bti and the malathion that hopefully will never be needed for killing adult mosquitoes?

Bti is *Bacillus thuringiensis israelensis*, a bacterial disease specific to mosquito and fly larvae. It does not affect much else. It is usually applied in pellet form to water. The application is therefore restricted and there is no drift. It can also be purchased for domestic use.

Malathion is an organophosphate (OP) insecticide, with definite recorded effects on human health such as respiratory problems including lesions at all concentrations tested, immune suppression, as well as effects on the nervous system. Sask Health's approach shows that using the less toxic and most targeted approach first is effective for controlling mosquitoes that potentially carry WNV. This follows the true definition of Integrated Pest Management (IPM).

The cost of controlling mosquitoes in rural areas is unaffordable. However, mosquitoes apparently stay within 1.5 km of the area where they hatch, so your best bet is to clean up your yard, and protect yourself.

Recent research indicates that spraying a yard with garlic extract will repel mosquitoes for around two to four weeks, although the smell evaporates within a few hours. Other research shows that a small copepod species, *Macrocyclops albidus*, will kill mosquito larvae even when they are not looking for a meal. Although this research was done in Florida, the species is found in

Saskatchewan. In my limited experience, Cyclops or mosquitoes is usually the rule in a pond. I don't believe I have ever found them together.

So, put West Nile virus in perspective. Do your homework, protect yourself, clean up around your property, and get your community to sign on to the Sask Health program. And have a good spring and summer!

References

- An excellent Canadian source of information on West Nile virus, pesticides registered for mosquito control, and alternative mosquito control and repellent information is the Canadian Coalition for Health and Environment web site (CCHE) at <http://www.cche-info.com/>; click on West Nile virus

- Sask Health VNV mosquito control program http://www.health.gov.sk.ca/ps_wnvprgm.html

Box

- Decrease mosquito breeding habitat around your home, (clean up, drill holes in tires, fill in small depressions that temporarily collect water etc)
- Make your own map of the wet spots around your area, and dip net to see which carry mosquito larvae
- Use *Bti* if lots of mosquito larvae in particular areas
- Protect yourself with a natural mosquito repellent

Personal Protection (box)

- Use a fan to blow away mosquitoes

- **protective clothing is always your best defence**

- Bathe regularly with peppermint, eucalyptus or unfragranced soap.

- avoid going out at dawn and dusk

- Apply natural mosquito repellents **to exposed skin, sleeves and trouser cuffs: Buzz Away,**

Kiss Off, Catnip oil is ten times MORE EFFECTIVE THAN DEET

(http://www.altnature.com/gallery/catnip_mosquito_repllent.htm); - **Bite Blocker;**

Fly Screen /

- There are new mosquito control devices, such as the effective **Mosquito Magnet**, which attracts and kills mosquitoes. For more information: <http://www.mosquitomagnet.com/>

To find out where the Mosquito Magnet can be bought at, contact:

National Energy Equipment, 10801 Ray-Lawson, Anjou, QC H1J 1M5.

Tel: 514.353.3001

Fax: 514.355.2223

Toll Free: 800.363.9960

- **Resist going on a swatting rampage when biting insects start hovering overhead. Studies indicate that such movement can double the number of mosquitoes attracted to you.**

- **Campers** can use fans and/or hang mosquito netting over cots, tent openings, picnic tables, etc. Long sleeves, long pants, hats, and veils give additional protection from mosquitoes.

Caution: If you are pregnant, do not use pennyroyal, even topically, as it may increase the risk of miscarriage.

Note: Citronella oil has been known to attract female black bears.

For More Information, please visit:

http://www.cche-info.com/pdf/cche--mosquito_management_home.pdf

Mosquito management-home

http://www.cche-info.com/pdf/cche--eliminating_mosquito_breeding_sites.pdf

Eliminating Mosquito Breeding sites on your property