

MOSQUITO CONTROL FOR HOMEOWNERS

By

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Mosquitoes are often annoying pests and may be carriers of other organisms that cause disease. This includes West Nile virus (WNV), which was discovered in Manitoba in 2002. The risk of people contracting West Nile virus is low, but it can be further reduced.

The most effective approach that people can take to reduce their risk is to use personal protective measures, such as wearing loose-fitting, long-sleeved, light-coloured clothing and using repellents to decrease the number of mosquito bites.

Another way to reduce the risk of West Nile virus infection is to control mosquito numbers directly. However, effective mosquito control is expensive, complex, and technically demanding, and is best left to trained professionals for good results.

It is important to understand that the methods available to non-specialists are different from those commonly used by professional mosquito control personnel.

Because mosquito larvae live in water, mosquito control may involve elimination of wet habitats (source reduction) and/or pesticide applications to reduce mosquito numbers. Source reduction is a preferable approach for mosquito control, when water that produces mosquitoes can be removed without causing other problems. Similarly, landscape planning that keeps water from accumulating is always a good bet.

Water accumulated in containers such as tires, rain barrels and water troughs is especially problematic because they also often accumulate organic material. These containers are especially attractive to mosquitoes of the *Culex* type, those most likely to play a role in WNV transmission.

On the other hand, natural wetlands, such as marshes, and artificial wetlands, such as storm-water retention ponds or sewage lagoons, have other purposes and can not be eliminated.

Shallow, wet areas that are sunlit, less than 60 cm deep and with plants growing at the edge are of most concern. If these areas produce mosquitoes, problems can be reduced by applying pesticides (larviciding) or by managing water levels or water flow to make the environment unsuitable for mosquito larvae. If there is consistent water movement created by flow (currents), wind action or aeration devices, mosquito larvae are unlikely to thrive in the habitat.

Pesticides are designed to kill the problem organism and they do so by being toxic. Therefore, some pesticides **MAY** pose risks to other organisms, including people, especially if not used correctly.

A combination of several factors determines exposure, including how much pesticide a person or animal takes in (the dose), the frequency of dosing and the duration of exposure. Exposure, in combination with innate toxicity (the amount of pesticide per unit of body weight required to cause harm), determines the level of risk to humans and other non-target organisms.

Trained and licensed pesticide applicators are educated to ensure target pests, like mosquitoes, are killed, while reducing the exposure of non-target groups. Trained personnel are also educated about using no more pesticide than what is required, as this reduces the amount of pesticide in the environment. Pesticide application is definitely one of those activities where more is not better.

There is currently only one pesticide product on the market licensed by the Pest Management and Regulatory Agency (PMRA) of Health Canada for domestic or homeowner larviciding. This product is made from bacteria that only kill mosquitoes, black flies and some closely related midges. It is very safe to use where people and other animals might be exposed. However, it requires a lot of judgment and experience to make it work effectively, as it only kills mosquito larvae during a short part of their development in the water. This product can be purchased under the trade name Aquabac from some home and garden vendors in Manitoba.

Larviciding requires a series of steps:

- Not all standing water produces mosquitoes. People who have standing water in sunlit areas that remains for at least 10 days to 2 weeks at summer temperatures (periods less than this do not permit mosquitoes to complete their life cycle) should determine if there are mosquitoes present.

This can be done by dipping approximately a half pint of water from the surface and looking for dark, slightly worm-like wrigglers which swim by bending their bodies in an "S" shape. (See <http://www.rci.rutgers.edu/~insects/dipping.htm> for information on dipping.) Dips should be taken from several different spots in a pool, depending on the area of the water, and the number of wrigglers or mosquito larvae should be estimated for each. If no mosquitoes are present in the dipped samples, then chances are good there is nothing serious enough to treat.

- If mosquitoes are found, then the stage of development should be determined so the larvicide can be applied at the right time. The wrigglers should be about 5-6 mm long - about half the width of your little finger nail. If the larvicide is applied too soon or too late, it may not kill very many mosquito larvae.
- The amount of water to be treated in square metres - (multiply the length by the width, with a long pace being approximately 1 metre) should be determined so the correct amount of larvicide can be measured out. The larvicide should then be distributed as evenly as possible according to the amount indicated on the label - a little more than half a gram per square metre (approximately one half teaspoon).
- One to two days after application, the number of mosquitoes remaining should be determined by dipping the same number of times to find out if most of the larvae have been killed. You need to kill at least 95% of larvae to significantly reduce the nuisance problem.

- This product needs to be reapplied about once a week, or whenever a new generation of mosquitoes hatches, as mosquito eggs are not killed by this larvicide.
- Larvicide effectiveness is also reduced when used in dirty water and when the temperature is cold. Generally, larvicide is not recommended unless used by experienced people.
- Furthermore, larviciding is not likely to be effective at reducing the biting population of adult mosquitoes, unless the larviciding is done on a large scale. For example, if your neighbour is not larviciding, his or her mosquitoes will likely invade your yard.

It is very important that people carefully read directions and consult with reliable information about safe and effective ways to kill mosquitoes. Larvicide can only be applied in water, as it does not kill adult mosquitoes. There is no point spreading it on your lawn or garden. It can only be applied to bodies of water that are wholly contained within a person's property and that are not connected by drainage to other water contained in ditches or natural wetlands.

Other chemical insecticides registered for farm use or home and garden use should NOT be used for mosquito control. This would be inappropriate use of these agents and illegal by regulations set out by the Pest Management and Regulatory Agency (PMRA) of Health Canada.

There may be cases where people will want to maintain water on their property, like rain barrels, ornamental ponds, drinking water for animals in troughs or dugouts on farms and acreages. These need not become mosquito habitats if certain steps are taken. For example, rain barrels can be fitted with tight lids and a screen placed on the inflow. This means only water will pass in from eaves troughs rather than leaves or pine needles, which would make the water more pond like and thus more attractive to mosquitoes. Screening rain barrels will also prevent female mosquitoes from laying their eggs at the water surface.

Ornamental ponds can be kept mosquito free by installing aeration pumps that keep the water moving or the surface disturbed. Some small ponds can be stocked with native fish, such as fathead minnows and mudminnows (use only fish native to Manitoba - do not stock small ponds or rainbarrels with fish purchased at pet stores). Vegetation growing in the pond may provide such hiding places for mosquito larvae that the fish become less efficient at finding and eating the larvae.

If water is not in short supply and if it is feasible, water troughs for farm stock can be flushed once a week to remove developing mosquito larvae.

If the previous approaches can not be made to work, small amounts of water in containers on private property can be treated once a week with a light coating of cooking oil. A small spritzer bottle can be used to spray a few drops per square metre, so that you can see an oil slick completely covering the surface. Cooking oil is non-toxic to animals that might drink the water, but will drown the mosquitoes and then evaporate within a day or so in the sun.

Similarly, a few drops of dish detergent per square metre applied to older, unscreened rain barrels will also create a film on the surface to drown mosquitoes.

Although it is possible to kill adult mosquitoes with different chemical pesticides than those used for larviciding, this method of mosquito control is even more difficult without adequate training and knowledge of mosquito behaviour.

There are hand-held foggers of various designs available for home and garden vendors and several chemical pesticides licensed for use with such equipment, but these pesticides are more toxic to the environment, to people and to other animals than is the larvicide product recommended in this document. These pesticides have to be used cautiously and according to the manufacturers label directions. This is particularly critical with respect to the amount and frequency of application and safety directions for the operation of the foggers.

Adult mosquitoes are widely dispersed and very difficult to kill. Because pesticides that kill adult mosquitoes spread pesticide into the general environment, they are less effective in targeting mosquitoes.

Some people may also be sensitive to the pesticides sold for use with these machines, and as the applicator has little or no control over where the chemicals drift, it is recommended that neighbours and other individuals be adequately notified about any plans to try mosquito control. Just as with larviciding, adulticiding is much less effective when it is done on a small scale, such as that represented by single residential properties. Additionally, incorrect application of adulticides may pose significant risks to beneficial organisms such as bees, butterflies, fish and birds.

Homeowners can have a bigger impact on the activity of adult mosquitoes by keeping hedges and lawns trimmed so there are fewer places with high humidity for mosquitoes to hide. Adulticiding for mosquito control should be left to trained and licensed professionals. Some local pest control operators may have such personnel in their employ.

Gadgets such as ultrasonic repellers, bug zappers, mosquito magnets, citronella candles and citrosa plants do not reduce mosquito numbers enough to change the risk of mosquito bites or the risk of becoming infected with West Nile virus.

Although some animals, such as bats and a few types of birds, do eat some mosquitoes, these predators do not eat enough mosquitoes to reduce the risk of West Nile virus. Most insect-eating birds feed during the day, so are not feeding when mosquitoes are most active. The same principle holds true for dragonflies. Bats tend to feed mostly on other insects, and they may be a rabies risk if successfully encouraged to roost around people.

People are much better served if they take basic steps to reduce the risk of mosquito bites. Keep environments free of places that will hold water and produce mosquitoes. Take personal precautions to reduce mosquito bites by changing outdoor activity during certain times of the day, using repellents with DEET and wearing appropriate clothing.

Mosquitoes are more active in the late afternoons and evenings, throughout the night and in the early morning hours when humidity is high, or during the day when conditions are cloudy/overcast and the humidity is higher. Taking extra precautions, including repellent use and wearing long sleeved, loose fitting, light coloured clothes with a tight weave, will help to reduce mosquito bites. Long sleeves and pant legs reduce the amount of skin exposed to mosquito bites.

Light colours and white are not as attractive to mosquitoes as are dark colours. Repellents applied to clothes, or in some cases to exposed skin, will also make mosquitoes less likely to bite. Many perfumes attract insects, including mosquitoes. Diet additives such as vitamin B12 and garlic have no influence on reducing the number of mosquito bites.

It is also important to know that mosquito control is seldom effective in reducing mosquito numbers to zero. The best line of defense for people to protect themselves from mosquito bites is by using the approaches outlined on the Manitoba government West Nile virus website.

Badly done mosquito control is costly and provides little or no protection. It is a public health tool better left to people trained to evaluate the presence of mosquitoes, operate the equipment for pesticide application and to judge the right time, place and method of control to get the best results.