

## Mosquitoes and Repellents

*Dr. Jody Green, Nebraska Extension*

Mosquitoes are both a nuisance pest and a health pest. They are known as the deadliest animal on earth (Think: Malaria, Dengue fever). There are 50 species of mosquitoes in Nebraska, half of them feed on human blood and only females bite because they require blood to produce eggs. Both male and female mosquitoes obtain nutrients from plant nectar.



Female *Culex* mosquito taking a blood meal. (Photo: Jim Kalisch)

### **1. Should we be worried about contracting diseases in Nebraska?**

Yes, West Nile virus is prevalent in Nebraska and symptoms can vary from having no symptoms at all, to flu-like symptoms and fever, to severe neurological damage, to serious fatal illness. We need to educate and prevent mosquito bites to protect us from illness.

### **2. How do mosquitoes transmit diseases?**

Mosquitoes have piercing-sucking mouthparts that inject saliva and anticoagulants to aid in attaining a blood meal from the host. Pathogens are acquired from infected hosts, replicated in the mosquito's body and transmitted to others, all without harming the mosquito. This can be person to person, bird to bird, or in the case of West Nile virus, bird to human.

### **3. Why are mosquito bites itchy?**

The itching is the body's response to the mosquito's saliva. The human immune system releases histamines and cause the itching, swelling and redness at the bite site. It is important to refrain from scratching in order to avoid secondary bacterial infections. Everyone reacts differently and sometimes the use of over-the-counter anti-itch treatments (After Bite®, Benadryl®) may help to relieve discomfort.

### **4. How can I keep mosquito bites down this year?**

- Because mosquitoes are aquatic in the egg, larval and pupal stages, it is important to dump any stagnant water. Mosquitoes will breed in the smallest amount of water, so dumping the water out of containers, dog bowls, planters, saucers, tires, children's

pools and toys will remove potential breeding sites. Dump water at least once a week to break the mosquito life cycle.

- Fix and repair window and door screens.
- Avoid the outdoors during peak mosquito times such as dawn and dusk.
- Wear light colored, loose fitting clothing because mosquitoes prefer dark colors and can bite through fabric.
- Use effective insect repellents.

### 5. Is DEET the only repellent that works?

Mosquitoes are attracted to the carbon dioxide we expel. Insect repellents like DEET change the receptors of mosquitoes, which prevent the insect from detecting us. They may still land, but they won't bite if coverage is thorough, the product is effective and the concentration is high enough. DEET (Off!®, Ben's® , Sawyer® , Repel®) at 25-30% concentration is effective at repelling mosquitoes for 8 hours.

DEET-free options that have been tested and evaluated include products with the following active ingredients:

- Picaridin (Sawyer®, Natrapel®)
- Oil of lemon eucalyptus (Repel®, Coleman®)
- IR3535 (Coleman®)



Active ingredients of effective products (from left to right): Oil of lemon eucalyptus 30%, picaridin 20%, DEET 25%, DEET 15%

### More about repellents:

- Higher percentages allow for longer protection, but it's suggested to only apply to skin the percentage needed.
- High percentages of DEET (98%) will dissolve plastics, so be aware using around watches, cameras, sunglasses and other plastic objects.
- Be careful spraying aerosols near eyes and faces.
- Creams and liquids can provide better application coverage.
- Use lower percentages on children and reapply if necessary.
- Apply to skin, but not skin under clothing.

## 6. Can you tell me about Thermacell® Mosquito Repellent?

Thermacell® is a battery-operated, portable device used outdoors to repel mosquitoes. It uses a butane cartridge that heats a chemical treated repellent mat that keeps mosquitoes out the area for a number of hours. The active ingredient is allethrin. From the reviews, it seems to be an effective product, especially those who are outdoors for long periods of time, but know that it is an insecticide.



Thermacell® is a portable device used to repel mosquitoes using a synthetic pyrethroid.

## 7. What can be applied to clothing to protect from mosquitoes?

Permethrin sprays are pesticides sold specifically to treat clothing, which can remain effective through multiple wears and 4-6 washings. Be sure to follow the instructions and allow clothing to dry before wearing. There are also clothing lines that are factory pretreated with permethrin which remain effective against mosquitoes and ticks for up to 70 washings.



Permethrin in an effective insect repellent applied to clothing not skin.

## 8. Do bracelets, citronella candles, essential oils and clip on fans work?

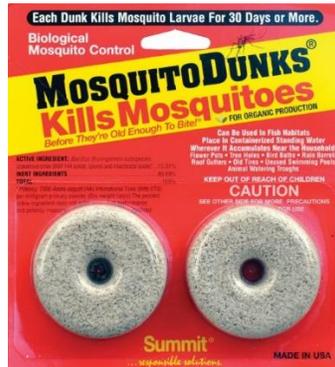
No. Neither does drinking beer, bug zappers, eating certain foods, taking vitamin B, using smart phone apps or plug-in ultrasonic devices.

### 9. Do chemical treatments to yards really work?

There are no products or equipment available to homeowners that are both economical and effective. Some professional companies may have fogging, misting, and blowing equipment that apply residual insecticide (synthetic pyrethroids) to places where adult mosquitoes rest and may contact a lethal dose of insecticide. Professionals should make applications to non-flowering vegetation, tree canopies, bushes, underside of leaves, sidewalks, decks, crawlspaces, under decks and other cool, dark locations. It is important to do this in conjunction with harborage removal in order to provide long-term treatment. Chemical treatments alone will only offer temporary relief.

### 10. How can I treat water that cannot be emptied at least once a week?

When water cannot be dumped, Mosquito Dunks® can be dissolved in standing water such as troughs, fishponds, rain barrels, and birdbaths. Mosquito Dunks® contain the active ingredient bacterium, *Bacillus thurengiensis israelensis* (*Bti*), which is toxic to mosquito larvae when consumed, but non-toxic to humans, pets, pollinators, fish and other wildlife. They are effective immediately and can last for a month.



Mosquito Dunks® are available in hardware stores.

### 10. I just saw the biggest mosquito ever. Could I have imagined that?

No, that was real. Nebraska has a giant day-flying mosquito, which is sometimes referred to as the shaggy-legged gallinipper. *Psorophora ciliata* is the largest mosquito in the United States and associated with floodwater and damp soil. Their bite is painful, but they do not transmit disease.



The bite from *Psorophora ciliata* can be quite painful (Photo credit: Jody Green)