

MAKE MEMORIES

Spend time outside enjoying friends and family not worrying about mosquitoes! Create a mosquito-free home and yard by removing standing water.

NOT MOSQUITOES!



Install and maintain window and door screens to keep mosquitoes outside.



Empty and clean pet food and water bowls often.



Clean out gutters and downspouts to prevent water from pooling.



Pick up outdoor toys that can hold water.



Avoid overwatering plants. Check flowerpot saucers for standing water.



Cover pools or treat water with appropriately labeled mosquito control products.



Change water in bird baths often or treat with appropriately labeled mosquito control products.



Pack stumps or tree holes with sand or cement.



Wear long sleeves and pants outside or apply an EPA-approved insect repellent.

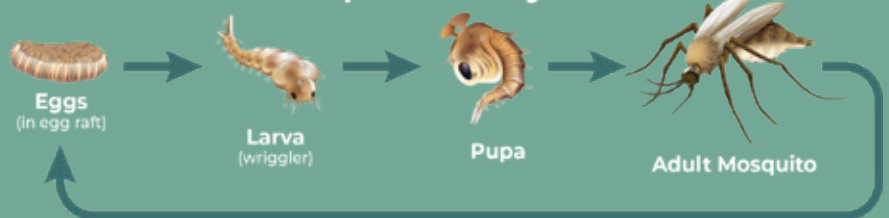


Pull tarps or plastic sheeting tight so water will not pool.

Controlling mosquitoes is a community effort.

Call a local mosquito control program to request help in locating breeding sites if you are unable to locate them yourself.

Mosquito Life Cycle



Mosquitoes can develop in water that stands for more than 5 days. Get rid of all standing water to control the mosquito population around your home and property.

Water can gather in many places. Be sure to check:

- Man-made containers
- Natural containers
- Tarps/sheeting covering yard items
- Bromeliad and pitcher plants
- Flowerpot saucers
- Rock pools
- Cans/bottles
- Tree/stump holes
- Clogged gutters and downspouts
- Magnolia leaves
- Tires
- Cut-off bamboo stalks

Visit scdhec.gov/mosquitoes for more information.



7 TIPS OF MOSQUITO PREVENTION

Mosquitoes can develop in water that stands for more than 5 days.

Use these tips to create a mosquito-free home and yard!



TIP over anything that can hold water, such as toys, dog bowls, plant saucers, vases, or bird baths.



TOSS or recycle any unwanted yard items that may collect water, such as old tires, junk, or trash.



TURN over items that can hold water like children's pools, wheelbarrows, or buckets.



TIGHTEN tarps over items like boats, wood piles, grills, and pools.



TAKE CARE of your property. Clean out debris from ditches, drains, and gutters. Keep grass cut low and trim or remove overgrown plants.



TREAT items that can't be drained or emptied with appropriate mosquito control products.



TEAM UP and talk with neighbors about reducing mosquitoes in and around your home and neighborhood.

LOCATE AND MANAGE SITES WHERE MOSQUITOES BREED

Any site where water stands for 5 days or more may breed mosquitoes.

Containers

- **Drain or get rid of containers** that hold water.
- **Pack sand or cement into natural containers** like tree holes.
- **Flush out or treat water-holding plants** with a small amount of food-grade oil or a safe mosquito control product.

Standing Water

- **Stock ornamental ponds with fish that eat mosquitoes**, such as “mosquito fish” (*Gambusia*) or small goldfish.
- **Keep shallow pond edges cleared** of plants and weeds.
- **Clean weeds, dirt, and debris from ditches** so water flows freely.
- **Treat small areas that can't be drained** with safe mosquito control products.
- **Fill low places** with dirt or cement.
- **Repair outdoor leaky pipes or faucets and failing septic tanks** that pool water.

Protect from Biting Mosquitoes

- **Properly apply an EPA-registered repellent** such as catnip oil, citronella oil, DEET, IR 3535, oil of lemon eucalyptus, picaridin, IR 3535, or 2-undecanone.
- **Avoid mosquitoes when and where they are most active** at dawn, dusk, twilight hours, and night or in shady areas during the day.
- **Avoid wearing fruity or floral scented products.**
- **Wear protective clothing**, such as a long-sleeved shirt, long pants and/or permethrin-treated clothing.
- **Wear light-colored clothing** because mosquitoes are attracted to dark colors.
- **Use mosquito coils and heated repellent pads** to repel mosquitoes in small areas.
- **Install and maintain screens** to keep mosquitoes out.
- **Trim overgrown plants** that provide resting areas for adult mosquitoes, such as shrubs, grass, weeds, vines, and ground cover.
- **Use yellow light bulbs or sodium-vapor orange lights outside** to prevent attracting mosquitoes.
- **Apply a pesticidal fog with a hand-held fogger** to provide temporary relief outdoors.
- **Protect your cat or dog from heartworms** by asking your veterinarian for preventative medicine.

SITES WITH STANDING WATER THAT MAY BREED MOSQUITOES:

Man-Made Containers

- Cans
- Bottles
- Buckets
- Flowerpot saucers
- Plant cuttings rooting in water
- Pet bowls
- Animal troughs
- Tires
- Birdbaths
- Wheelbarrows
- Children's toys
- Wading pools
- Neglected swimming pools
- Rain barrels
- Clogged roof gutters and downspouts
- Catch basins
- Boats
- Junk cars
- Plastic sheeting or tarps used to cover yard items

Natural Containers

- Rock pools
- Tree and stump holes
- Bamboo stumps
- Magnolia leaves
- Bromeliad and Pitcher plants

Standing Water

- Ornamental ponds
- Shallow pond margins with plant growth
- Clogged ditches
- Ground pools
- Tire ruts
- Leaky pipes and outdoor faucets
- Failing septic tanks



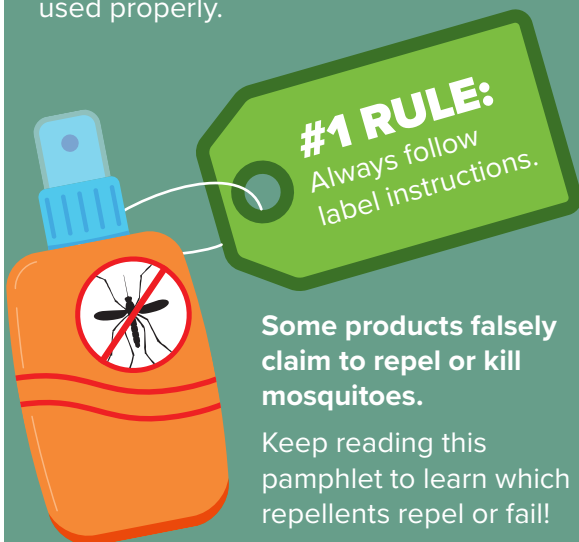
Call a local mosquito control program for help in locating breeding sites if you are unable to locate them yourself. Controlling mosquitoes is a community effort.

Prevent Mosquito Bites



Wear long sleeves and pants when you can. Mosquitoes can bite through thin clothing, so spraying clothes with mosquito repellent will give extra protection.

Use mosquito repellent, which comes in many forms: **chemical**, **natural**, or **mechanical**. Some are well-tested, effective, and safe for your family when used properly.



#1 RULE:
Always follow
label instructions.

Some products falsely claim to repel or kill mosquitoes.

Keep reading this pamphlet to learn which repellents repel or fail!



Want to learn more about mosquitoes or how to make your yard and home a mosquito-free zone?

CHECK OUT:
scdhec.gov/mosquitoes

Sources

1. Rodriguez SD, et al. (2017). Efficacy of Some Wearable Devices Compared with Spray-On Insect Repellents for the Yellow Fever Mosquito, *Aedes aegypti* (L.) (Diptera: Culicidae). *Journal of Insect Science* 17(1).
2. Andrade CFS and I Cabrini (2010). Electronic mosquito repellents induce increased biting rates in *Aedes aegypti* mosquitoes (Diptera: Culicidae). *Journal of Vector Ecology* 35(1): 75-78.
3. Revay EE, et al. (2013). Evaluation of commercial products for personal protection against mosquitoes. *Acta Tropica* 125(2): 226-230.
4. Revay, E. E., et al. (2013). "Reduction of mosquito biting-pressure: Spatial repellents or mosquito traps? A field comparison of seven commercially available products in Israel." *Acta Tropica* 127(1): 63-68.
5. Müller GC, et al. (2008). Indoor Protection Against Mosquito and Sand Fly Bites: A Comparison Between Citronella, Linalool, and Geraniol Candles. *Journal of the American Mosquito Control Association* 24(1): 150-153, 154.
6. American Mosquito Control Association. Repellents. Retrieved 23 July 2021, from <https://www.mosquito.org/page/repellents>.
7. United States Environmental Protection Agency (12 January 2021). Skin-Applied Repellent Ingredients. Retrieved 23 July 2021, from <https://www.epa.gov/insect-repellents/skin-applied-repellent-ingredients>.
8. Dormont, L., et al. (2021). "Mosquito Attractants." *Journal of Chemical Ecology* 47(4): 351-393.



CHEMICAL METHODS

The Environmental Protection Agency (EPA)⁷ recommends several active ingredients for insect repellents:

- DEET
- Picaridin
- Oil of Lemon Eucalyptus (OLE)
- 2-undecanone
- p-Methane-3, 8-diol (PMD)
- IR 3535
- Permethrin
(not for use on skin)

DEET-based repellents have been around for more than 50 years and remain the standard by which other repellents are judged⁶.

PMD is derived from the Lemon Eucalyptus tree but also can be chemically made in a laboratory. The effectiveness of PMD is comparable to DEET-based repellents¹.



REMEMBER

HIGHER CONCENTRATION \neq MORE PROTECTION

When applied correctly, 10% DEET will protect you for about 2 hours, and 50% DEET will protect you for about 5 hours.

NATURAL METHODS

While not every natural product will repel mosquitoes, some EPA-recommended natural oils will keep them at bay, like:

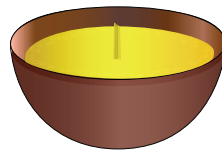
- Catnip Oil
- Lemon Eucalyptus Oil
(contains only trace amounts of PMD)
- Citronella Oil



Some products containing these oils are registered with the EPA, but the effectiveness of products containing these oils depends on the concentration of the active ingredient and product formulation that prevents fast evaporation⁷.

⚠️ Direct application of an undiluted form of oil-based repellent can cause skin irritation.

Citronella candles and torches are one of the most common but least effective mosquito repellents. Geraniol, found in essential oils of many fragrant plants and a component of citronella oil, may be a better option. A 5% geraniol candle is 5 times more effective at repelling mosquitoes than 5% citronella⁵.



MECHANICAL METHODS

Oil-Infused Wristbands, Patches, and Stickers

- These products offer little to no protection³.
- The concentration of active ingredient(s) within these products is often not high enough to repel mosquitoes.



Repellent Tabletop and Clip-On Diffusers

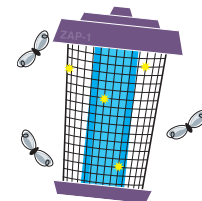
- Some brands of repellent diffuser products are effective in repelling mosquitoes, such as those containing metofluthrin, allethrin, and at least one product containing a mixture of cinnamon oil, eugenol, geranium oil, peppermint, and lemongrass oil^{3,4}.

Electronic or Soundwave Repellents

- Soundwaves are not useful at repelling mosquitoes, and some frequencies may even increase bites².

Bug Zappers

- These traps attract and kill beneficial insects like moths and beetles. **They do not attract and kill mosquitoes.**



TRUE OR FALSE?

Mosquitoes bite more in the afternoon and morning.

FALSE! Mosquitoes can bite any time of night or day, especially in shade. Early mornings and late afternoons are peak biting times for day-active mosquitoes, whereas night-active mosquitoes bite more often at dusk and dawn. All mosquito types avoid sun and heat.

Mosquitoes display preferences for certain individuals over others.

TRUE! Mosquitoes are attracted to certain individuals more than others due to differences in metabolic rate and odors from chemicals produced by the human body or bacteria on the skin⁸.

Your clothes make you more attractive to mosquitoes.

TRUE! Mosquitoes are more attracted to red, navy blue, and black colors. Darker shades are more likely to attract mosquitoes than lighter shades.