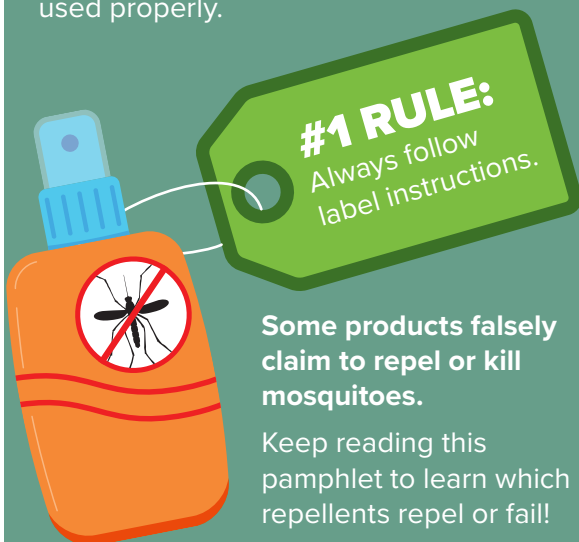


## Prevent Mosquito Bites



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.



**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:**

**[dph.sc.gov/mosquitoes](https://dph.sc.gov/mosquitoes)**

### Sources

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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.

**DON'T LET  
MOSQUITO BITES  
RUIN YOUR**

**NIGHTS**

**PROTECTING YOURSELF  
FROM MOSQUITO BITES:  
Separating Fact from Fiction**



**SOUTH CAROLINA  
DEPARTMENT OF  
PUBLIC HEALTH**

# CHEMICAL METHODS

The Environmental Protection Agency (EPA)<sup>7</sup> 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 judged<sup>6</sup>.

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 repellents<sup>1</sup>.



## 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:

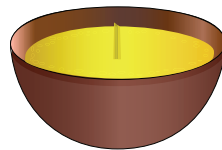
- Catnip Oil
- Lemon Eucalyptus Oil  
*(contains only trace amounts of PMD)*
- Citronella Oil



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 evaporation<sup>7</sup>.

**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% citronella<sup>5</sup>.



# MECHANICAL METHODS

## Oil-Infused Wristbands, Patches, and Stickers

- These products offer little to no protection<sup>3</sup>.
- The concentration of active ingredient(s) within these products is often not high enough to repel mosquitoes.



## Repellent Tabletop and Clip-On Diffusers

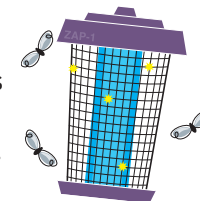
- Some brands of repellent diffuser products are effective in repelling mosquitoes, such as those containing metofluthrin, allethrin, and at least one product containing a mixture of cinnamon oil, eugenol, geranium oil, peppermint, and lemongrass oil<sup>3,4</sup>.

## Electronic or Soundwave Repellents

- Soundwaves are not useful at repelling mosquitoes, and some frequencies may even increase bites<sup>2</sup>.

## 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 skin<sup>8</sup>.

**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.