

# The most effective bug sprays to keep mosquitoes and ticks away

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- **If you're spending time outside, you should use bug spray to ward off disease-carrying [mosquitoes](#) and [ticks](#).**
- **Some repellents work better than others — products with DEET and PMD tend to be best for mosquitoes, according to some research.**
- **For ticks, even though DEET and other repellents help, you may want to consider permethrin-treated clothing and gear.**
- **Other products marketed for keeping bugs away, like citronella candles, don't work.**

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There are many good reasons to seek out effective insect repellent.

The most obvious one is that [bites from mosquitoes other bloodsuckers](#) are obnoxious and itchy. But beyond that, pests like mosquitoes and ticks can carry potentially dangerous [diseases](#) like the [Zika virus](#), [Lyme disease](#), an [allergy to red meat and mammal products](#), and [more](#).

Cases of these mosquito- and tick-borne diseases [tripled between 2004 and 2016](#) in the US, and that infection rate is expected to continue to rise as the world warms.

When you are facing a wall of bug spray options, it's hard to know which to choose. Should you opt for DEET, which is [considered safe by the CDC](#) but sometimes makes people wary? Or something more natural-sounding, like oil of lemon eucalyptus? Perhaps one of those alternative bug repellent options like citronella?

For those faced with these questions, the [EPA offers a tool](#) to help you select a type of bug spray that best fits your needs. But if you just want to know which active ingredients work best, research shows that some repellents work better than others — and some don't work at all.

Here's what to use.

## **The best mosquito repellents**

As a general rule, effective products for warding off mosquitoes contain DEET, picaridin, or IR3535. Sprays or creams containing oil of lemon eucalyptus or PMD (the active ingredient in oil of lemon eucalyptus) work too, but those should not be used on kids under three.



A female *Aedes aegypti* mosquito takes flight with newly obtained red blood visible in her transparent abdomen. REUTERS/Centers for Disease Control/James Gathany

DEET is safe for children over two months of age and for pregnant women, but there's no repellent for younger infants. The American Academy of Pediatrics says not to use [DEET concentrations higher than 30%](#) on kids and recommends they wash their skin after returning inside.

Generally, use higher concentrations if you're going to be outside for longer and follow instructions on labels for when to re-apply.

These recommendations have been backed up by recent scientific research. For a study published in the [Journal of Insect Science in 2017](#), a team of researchers tested an array of bug sprays against *Aedes aegypti* mosquitoes, the ones known to carry Zika. Those researchers also published a similar study in the [same journal in 2015](#), in which they tested repellents against both *Aedes aegypti* and *Aedes albopictus* mosquitoes (the latter is more common in the US).

Their results showed that certain popular products do almost nothing to keep mosquitoes away. Citronella candles were basically useless, as were vitamin B skin patches, sonic devices, and most wearable products. The one wearable this did keep mosquitoes away was the OFF! Clip-on device, which uses a fan to circulate repellent containing metofluthrin in the nearby air. (The researchers wrote that other wearables relied on seemingly less-effective chemicals.)

DEET and PMD products were the best and most long-lasting at keeping mosquitoes away, the researchers found. Their results suggested that picaridin products can be somewhat effective, though less so than DEET and PMD. However, other researchers have [said picaridin can be more effective](#) and works as an acceptable alternative.

Amusingly, the researchers' 2015 study also tested Victoria's Secret Bombshell perfume. The scientists guessed that the floral scent might attract mosquitoes, but it turned out that the bugs hated the scent and stayed away. The effect didn't last as long as DEET or PMD, though.



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## Bug spray for ticks

Some of the same products that work for mosquitoes can keep ticks away — the main options for tick repellents also contain DEET, PMD, or picaridin. But the products may be less effective against this type of bug.

Another protective approach is to treat your clothing and outdoor gear with [with permethrin](#) to help ward off Lyme-disease carrying arthropods.

The chemical doesn't work on your skin, since it doesn't stay on there. But clothes or camping gear that have been treated with permethrin can deter bugs. According to a study published in the [Journal of Medical Entomology](#) in May, it takes less than a minute for the black-legged tick nymphs that can spread Lyme disease to die or become immobilized after being placed on permethrin-treated gear.

Clothes pre-treated with permethrin are good for around 70 wash cycles. Always wash permethrin-treated clothing separately, and check labels to see how long your treatment is good for.

You can also buy a permethrin wash or spray to apply to your own clothes, boots, or tents. These self-applied sprays don't tend to be effective as long as pre-treated materials, but sprays can always be re-applied later.

Permethrin helps keep mosquitoes away too, except in places where the flying bugs have developed resistance to it, like Puerto Rico.

Do what you can to protect yourself this summer — that'll make it easier to enjoy your time outside.