

# When bugs want to bite, what do you do?

---

By Jill U. Adams July 6, 2015

Every spring it starts. The Facebook posts and the conversations overheard at the coffee shop. A solution of equal parts vinegar and water was just the thing to keep mosquitoes from biting. And rose geranium oil is magic against ticks.

Concoctions are offered up as natural alternatives to traditional insect repellents, nearly all of which contain the chemical DEET. Some perceive that DEET, shorthand for a synthetic chemical with an unpronounceable name, is a dangerous substance to be avoided.

In addition to home brews, there are commercial versions of DEET-free bug sprays, labeled with words like natural, organic and botanical. Side-by-side tests show a range of effectiveness. Some are good, some are short-lasting and others are practically useless.

“There are lots of promises out there that don’t deliver and people end up going back to DEET,” says Brooke Bissinger, who specializes in plant-based repellents and is director of entomology at AgBiome, a North Carolina biotech company. “There are some people who refuse to use DEET and some who are reluctant users — especially parents who want to put something safe on their kids.”

Here’s the thing — DEET is not what many people perceive. The Environmental Protection Agency considers DEET safe when applied according to package instructions. This includes children of all ages. The American Academy of Pediatrics says no insect repellents should be used on babies under 2 months old.

And DEET is very effective. A study from 2002, published in the New England Journal of Medicine, found the DEET- containing bug sprays to be superior in protection and duration against mosquitoes when compared with most botanical formulations.

The overall winner was Off! Deep Woods insect repellent, made by SC Johnson, which protected study volunteers for five hours. The volunteers put their arms into a cage of mosquitoes intermittently and the time to the first bite was recorded. (In the study, Off! Deep Woods was reported to contain 23.8 percent DEET; today's product is labeled as containing 25 percent DEET.)

What else worked? Three other DEET repellents with concentration ranging from 2.75 percent to 20 percent offered complete protection for more than one hour. One DEET-free product did as well; called Bite Blocker and made by HOMS, the tested spray contained 2 percent soybean oil.

Products containing citronella or citronella with a mix of plant oils (peppermint, cedar, lemon grass and geranium) offered less than 30 minutes of protection. Also in this group was Avon's Skin-So-Soft Bug Guard Plus, containing 7.5 percent of a synthetic repellent known as IR3535. (Avon's Skin-So-Soft bath oil, long rumored to offer insect repellent properties, came in at less than 10 minutes.)

Plant oils do have repellent properties, but that doesn't necessarily mean they're good choices. "Depending on the formulation, the botanicals — citronella, cedar and eucalyptus oil — are typically short-lasting," says Jonathan Day, a medical entomologist at the University of Florida in Vero Beach who co-authored the 2002 study in the *New England Journal of Medicine*. "So, you could reapply every 20 minutes. More realistically, we look for protection times of at least an hour."

It depends on your needs: how long will you spend weeding the garden or out on the deck at a neighbor's barbecue?

The DEET-free insect repellents exist because there is a market for them — people who worry about the risks of spraying DEET on their skin. Day reminds people to weigh the potential risks of DEET against the risk of being bitten by a West Nile Virus-carrying mosquito or a Lyme disease-loaded tick.

Plant repellents are not completely risk-free either. "Oil of eucalyptus tends to be irritating to some people," Day says, adding that a couple of the volunteers in his study developed skin reactions. That's one reason the concentrations of plant oils tend to be low, in the 2 to 10 percent range, he says. Likewise, some people are sensitive to DEET, again with rashes or other skin reactions.

Reports of adverse events related to DEET are relatively rare, health officials say, and improper use — such as ingestion, inhalation, eye exposure, or heavy, repeated application of DEET-containing products — is often to blame.

“The number of adverse events is very small,” Bissinger says, especially when you consider the millions of people who use DEET repellents every year.

---

## Health/Science alerts

[Sign up](#)

Breaking news on health, science and the environment.

---

Far less information is available on the hazards of plant-based insect repellents. Those are typically skin reactions — irritations or allergies.

Product labels carry application instructions to keep the product from getting beyond the skin. That means taking care to stay away from cuts or wounds, the eyes and mouth, and to avoid breathing in the sprayed mist. For kids, we’re told to not apply DEET-containing repellents near the eyes or mouth or on hands, so that fidgety kids don’t rub the stuff someplace it shouldn’t be.

Day says other protective measures can help you limit DEET exposure, such as wearing long pants and long-sleeve shirts and a hat. “I put repellent on my neck, my forehead and my hands,” he says. For tick protection, tuck your long pants into your socks and spray DEET repellent on your boots and pants up to your knees.

Companies focusing on the market for natural products are trying to develop more robust products. Two recent studies showed that a plant-based repellent called TT-4302, was comparable to DEET in terms of [protecting against mosquitoes and ticks](#). (The studies were conducted by scientists at TyraTech, the company that makes TT-4302, but were peer-reviewed.)

The repellent contains 5 percent geraniol — a naturally occurring compound that’s found in rose oil, citronella oil and geranium oil. TyraTech markets its product under the name Guardian Wilderness.

## The Post Recommends

### Jon Stewart perfectly diagnosed the problem with Hillary Clinton’s candidacy

"Hillary Clinton" vs. Hillary Clinton.

## **The debate between Clinton and Trump is over before it starts**

Cartoon for June 9, 2016.

## **Elon Musk provides new details on his 'mind blowing' mission to Mars**

In an exclusive interview, Musk said he hopes to land people on the Red Planet in 2025.