



# BUG REPELLENT: *Alternatives & Tips*

## A MADE SAFE® FACT SHEET

It's important to think about what's in bug spray. The more it's applied, the greater the exposure to potentially harmful ingredients. Over a vacation or summer season this can result in meaningful cumulative exposure.

Conventional insect repellents contain a mix of active ingredients listed on the label and inert ingredients that aren't listed on labels. Both categories can include chemicals linked to harming human health and/or the environment.

At Made Safe, we don't permit high risk pesticides and chemicals known to harm human health, aquatic life and/or the environment in our products. That means no registered pesticide chemicals. However, we also recognize that there is a time and place for the use of bug sprays containing ingredients we don't certify. We urge people to educate themselves on this topic and stay on top of advice from the CDC and WHO. Note that tips and alternatives listed here are meant to reduce exposure to chemicals of concern and may work for casual settings to diminish bites, but cannot prevent diseases.



### PLANT-BASED ALTERNATIVES

Some plants have pharmacological and biological properties that make plant extracts effective insect repellent. Some botanical-based repellents can also be irritating to the skin, so try a small patch test before use. Because essential oils are highly concentrated, they can be highly potent too. If you plan on exploring making your own bug repellent formulas using essential oils, make sure to research before beginning.

#### Citronella

Citronella works best as part of a skin-applied mixture; studies show that candles only reduce bites by 50%. This oil is also volatile and evaporates quickly and so must be combined with another ingredient that can slow evaporation in order for it to be effective. Some studies document citronella as having a low toxicity profile whereas others have deemed it problematic. For example, the EU Commission lists citronella as an established contact allergen. Health Canada, a Canadian federal public health agency, proposed the phase out of citronella for use in bug sprays in 2004 because of suspected carcinogenicity.

#### Clove Oil

In a study that tested the efficacy of five oils and various combinations of those oils, clove oil was found to be one of the two most effective mosquito repellents. Clove oil is also effective when mixed with other oils. When mixed with geranium oil or thyme oil, the mixture protected against bites for up to 2.5 hours. Clove can cause irritation and is listed as an established contact allergen by the European Commission. One study stated that clove is considered safe at concentrations up to .5%.





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### Geraniol

Geraniol is considered one of the most effective botanical repellents, repelling malaria, filarial and yellow fever vectors for a period of 60-180 mins. This chemical can be derived from some essential oils like rose oil and can also be synthesized. Geraniol is one of the most common fragrance allergens found in personal care products. Some people find geraniol very irritating and it is considered an allergen by the European Commission.

### Lemongrass

Lemongrass oil can also be listed as cymbopogon citratus or schoenanthus oil. One study found that lemongrass oil was 74% and 95% effective against two species of mosquitoes, respectively, for up to 2.5 hours. In laboratory studies, the oil was 78.8% effective against one species of mosquito for 12 entire hours, but another study found it 100% effective for only 30 minutes. This oil has been established as a contact allergen in humans by the European Commission. Some people might find using this oil to be irritating or to cause allergic reactions.

### Lemon Eucalyptus

Oil of lemon eucalyptus can be naturally derived through hydro-distillation, or it can be synthetically produced and listed as p-menthane-3,8-diol or PMD, which is the synthesized version. The EPA has approved PMD as an effective insect repellent. One study found that a eucalyptus-based repellent containing 30% PMD gave 96.89% protection for 4 hours, where DEET gave 84.81% protection. The CDC advocates for the use of PMD.

### Linalool

This chemical can be derived from lavender or synthesized. Some people can experience allergic reactions to linalool. It is a skin sensitizer.

### Neem

Efficacy studies of neem have yielded variable results. According to one source, several field studies have shown neem to be an effective repellent. It is important that neem is diluted properly as it can cause irritation if used in very high concentrations.

### Thyme

One study that tested the efficacy of five oils independently and in various combinations found thyme oil to be one of the most effective mosquito repellents, providing 1.5 to 3.5 hours of protection and repelling malaria, filarial and yellow fever vectors for a period of 60-180 mins. One study stated that thyme is considered safe at concentrations up to 2%. Thyme can be slightly irritating to the skin, but has a very low toxicity profile.

### CARRIER OILS

Using a carrier oil is important with plant-based repellents. Many essential oils are very volatile, which means that they can evaporate quickly. Carrier oils can decrease the rate at which an essential oil evaporates, helping the finished product to repel mosquitos longer. Coconut and andiroba oils both contain unsaturated fatty acids and natural emulsifiers that help volatile essential oils to evaporate much more slowly.





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### ALTERNATIVE WAYS TO HELP KEEP BUGS AT BAY

**Time of day:** Mosquitoes are typically the worst at dusk and dawn in the United States.

**Use mosquito netting:** Netting works great for camping, strollers, baby carriers, and on the porch.

**Cover up:** Cover exposed skin with long sleeves, pants and socks.

**Keep the yard clear of places where mosquitoes like to breed,** which can help reduce the need for yard foggers. Mosquitoes like to breed in open water so cover anything that's not in use: buckets, pools, unused flower pots, etc. The rain gutters, if not in good repair and flowing properly, can also provide a breeding ground for mosquitoes.

### ZIKA AND OTHER MOSQUITO-BORNE ILLNESSES

Knowing your area and if you are at risk for a mosquito-borne or tick-borne illness can help you make the right bug repellent choice for you and your family. Go to Consumer Reports' [Guide to Mosquito and Tick Diseases](#) for information for your area.

As of July 2016, there were more than 1600 confirmed cases in the United States of Zika virus (a condition that can cause microcephaly, where babies are born with unusually small heads). While the vast majority of these cases were contracted from travel abroad, a growing number of cases were contracted in Florida. The CDC recommends avoiding travel abroad to countries with confirmed Zika cases and has issued warnings in Miami, FL as well. This list is changing and should be monitored as the Zika virus spreads. Note that the CDC recommends using EPA-approved insect repellents, which include DEET, IR3535, citronella, picaridin, and lemon eucalyptus oil.

Zika virus should be taken very seriously. Here is [one recent article](#) in the *New York Times* about the virus. We urge people to keep apprised of the changing information around this epidemic, the areas impacted and any changes in advice as it becomes available.

**If you think you might be at risk** or are experiencing [symptoms](#) of an insect-borne illness, heed the advice from the [CDC](#), [WHO](#), and your doctor.

### MADE SAFE CERTIFIED PRODUCTS

MADE SAFE screens products for chemicals that are harmful to human health and the environment. We only approve products that pass our rigorous testing protocol, and we don't permit high risk pesticides. This means that any approved products are taking a natural approach to bug repellent and there may be situations in which conventional bug repellent is preferable.

#### **Kosmatology Bug Repellent Balm\***

Made with a mixture of herbs, essential oils, and coconut oil.

#### **Oilogic Bug Bites & Itches Essential Oil Roll-On\***

Made with a mix of essential oils to soothe skin irritated by bites.

*\*MADE SAFE does not test for efficacy. We examine ingredients for human health and environmental harm. Please see below for efficacy studies on plant-based repellent ingredients.*

