

# Insect Repellents



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## Topic Overview

You can lower your chance of being bitten by an insect or spider-like animal (arachnid) by using insect repellents. Mosquitoes, biting flies, and ticks can cause annoying bites and sometimes a serious disease. Mosquito bites can spread infections such as [West Nile virus](#), a virus that causes swelling of the brain ([encephalitis](#)), [Zika virus](#), and [malaria](#) in some parts of the world. Tick bites can cause serious diseases such as [Lyme disease](#) and [Rocky Mountain spotted fever](#). Bites from biting flies are painful and may cause a [skin infection](#).

You can buy many different kinds of insect repellents. Some work better than others. DEET provides the longest-lasting protection against mosquito bites.<sup>[footnote 1](#)</sup>

## Products that work the best

**DEET** (N,N-diethyl-3-meta-toluamide) is the most effective insect repellent.

- A solution of 23.8% DEET provides about 5 hours of protection from mosquitoes.<sup>[footnote 3](#)</sup> In Canada, DEET is available in varying strengths up to 30%. Research shows that strengths greater than 50% do not provide substantially higher protection. Unless you are in areas with a large number of mosquitoes, repellents with 10% to 24% DEET should keep most mosquitoes away from your skin.
- Concerns have been raised about safety, because DEET is applied to the skin. Studies over the past 40 years haven't shown that DEET causes cancer or other illnesses.
- Experts disagree about the safest concentration of DEET to use on children. No serious illness has been linked to the use of DEET in children when used according to the product recommendations. In Canada, experts recommend that only those repellents containing less than 10% DEET be used on children younger than 12 years old. DEET products are not recommended for children younger than 6 months.
  - When applying DEET to children 6 months to 24 months of age:
    - Use only when there is a high risk of insect bites.
    - Use repellents with the lowest concentration of DEET available (usually 10% or less).
    - As with all insect repellents, use sparingly, and never apply to the hands or near the eyes.
    - Apply no more than 1 time a day, and avoid prolonged use.
  - When applying DEET to children 2 years to 12 years of age:
    - Use repellents with the lowest concentration of DEET available (10% or less).
    - Apply no more than 3 times a day, and avoid prolonged use.
- Public Health Agency of Canada recommends that all ages use 30% strength when travelling in areas of the world where the risk of malaria or other insect-borne infection is high.
- If you are pregnant or breastfeeding and have concerns about the use of DEET, talk with your doctor. There is no evidence that the use of DEET by pregnant or lactating women poses a health hazard to developing babies or children who are breastfeeding.
- Do not use DEET products that are combined with sunscreen. Sunscreen needs to be applied more often than DEET.
- DEET reduces how well sunscreen works. If you need to use sunscreen and DEET at the same time, put on sunscreen first and wait 15 minutes before applying DEET. Do not use DEET on skin that will be covered by clothing.
- DEET should also be used carefully on clothing. DEET may damage some synthetic fabrics as well as plastic watch crystals and eyeglass frames.

## Icaridin (Picaridin)

- Icaridin works as well as DEET in repelling insects when used at the same concentrations and is approved for use up to 20%. But only concentrations up to 10% are normally available in Canada.
- Icaridin is odourless and does not feel sticky or greasy.
- It is less likely to cause skin irritation than DEET.
- It does not damage synthetic fabrics or plastics.

Using icaridin on children:

- Children age 6 months or older may use up to 20% icaridin.
- Health Canada does not recommend the use of icaridin on children younger than age 6 months. But if you are in an area with a high risk of insect-borne disease (such as malaria), the Committee to Advise on Tropical Medicine and Travel (CATMAT) recommends that children under age 6 months use 10% icaridin.

**Permethrin** is not available as an insect repellent in Canada, but it is used in other parts of the world to prevent insect bites. It is a plant-based insecticide that works on contact. You spray it on clothing and other fabrics, such as mosquito netting and tent walls. Permethrin should not be applied directly to the skin. When it is combined with DEET, permethrin provides even better protection against mosquitoes. Permethrin keeps working even after you wash your clothes.

**P-menthane-3,8-diol.** This insect repellent is commonly known as lemon eucalyptus oil. When oil of lemon eucalyptus was tested against mosquitoes found in the U.S., it provided protection similar to repellents with low concentrations of DEET. It provides up to 2 hours of protection against mosquito bites. Do not apply more than 2 times a day. And do not use this product on children younger than 3 years.

**Soybean oil.** Insect repellents that contain 2% soybean oil provide 1 to 4 hours of protection from mosquitoes when applied to the skin. Soybean oil is safe to use on infants and children.

**IR3535.** This repellent is a chemical similar to the amino acid alanine. Tests have shown that it can protect against mosquito bites for up to 1 hour.

## Products that don't protect against bites for long periods of time

**Citronella** is a lemon-scented oil, derived from a plant, that repels mosquitoes. It is not as effective or as long-lasting as DEET. The product can be reapplied frequently to increase its effectiveness. Citronella can be found in lotions or in candles for outdoor use. Citronella applied to the skin provides 15 to 20 minutes of protection from mosquitoes. There is no scientific evidence that citronella candles are effective.

**Other plant oils.** Other plant oils, such as lavender and geranium, provide less than 30 minutes of protection against mosquitoes. These products aren't recommended.

## Products sold as repellents that don't work well to prevent bites

There are other products advertised as mosquito repellents that don't effectively prevent mosquito bites. These include:

- Electronic (sometimes called ultrasonic) devices.
- Electrocuting devices, which are often called "bug zappers."
- Mosquito traps.
- Geranium house plants.
- Citronella candles.
- Taking thiamine (vitamin B1) supplements.
- Skin moisturizers that don't contain approved insect repellents.
- Wrist, ankle, and neck bands that contain repellents, such as DEET or citronella.

## How to use insect repellent safely

Read and follow all instructions on the label. Health Canada and the U.S. Environmental Protection Agency (EPA) recommend the following precautions for using insect repellents:

- Apply repellents only to exposed skin or clothing as directed on the product label. Do not use under clothing.
- Never apply a repellent to cuts, wounds, or irritated skin.
- Do not apply to the eyes and mouth, and apply sparingly around the ears. When using sprays, do not spray directly into your face. Spray on your hand first, and then apply to your face.
- Do not allow your child to handle the product, and don't apply the repellent to your child's hands. When using a repellent on your child, apply it to your hands and then put it on the child.
- Do not spray in enclosed areas, such as inside a car. Avoid breathing a repellent spray, and do not use it near food.
- Use just enough repellent to cover exposed skin or clothing. Heavy application and saturation generally isn't necessary for effectiveness. If biting insects don't respond to a thin film, apply a bit more.
- After returning indoors, wash treated skin with soap and water and then bathe. This is particularly important when repellents are used repeatedly in a day or several days in a row. Also, wash treated clothing before you wear it again.
- If you think you or your child may be having a reaction to an insect repellent, stop using the repellent, wash treated skin, and call your doctor or local poison control centre. If you see your doctor, take the repellent with you.

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