



Choosing a Bug Repellent

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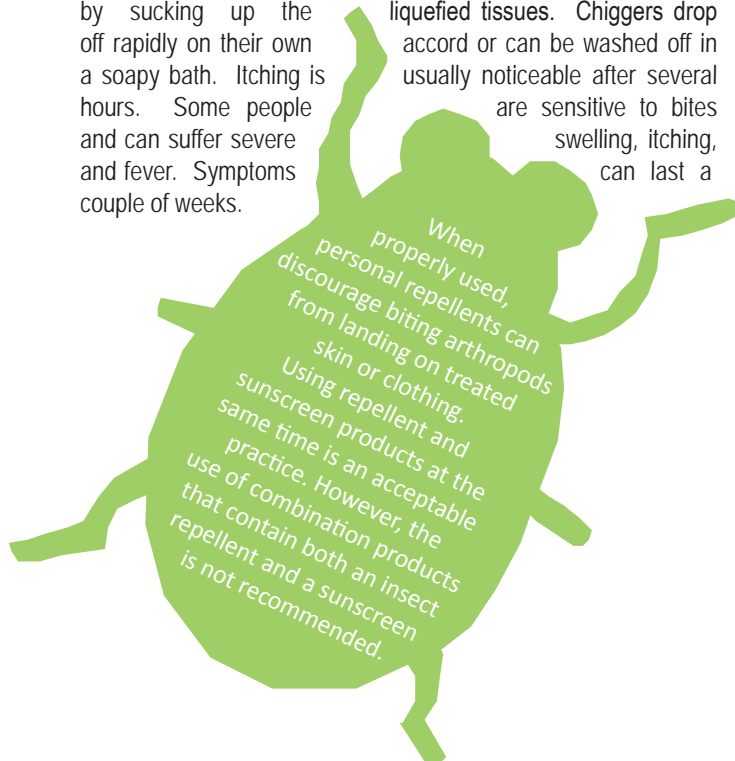
Bugs can be annoying and sometimes pose a risk to public health.

Species of mosquitoes in Arizona are vectors of pathogens that cause western equine encephalitis, St. Louis encephalitis, and West Nile fever. West Nile Fever is caused by the mosquito-borne West Nile virus, the majority of people infected have a mild illness or no symptoms at all. In some cases the virus can cause a more serious condition called encephalitis (inflammation of the brain). The elderly are at a higher risk of suffering severe medical symptoms. Up-to-date information on West Nile in Arizona can be found at <http://www.azdhs.gov/phs/oids/westnile/index.htm>.

Biting Bugs (no-see-ums, black flies, horse & deer flies) can inflict a painful bite, causing irritation that can persist for days, and may become infected.

Ticks can be vector agents of serious diseases like Lyme disease (the north western corner of Arizona is classed as a low risk area, the chances of contracting Lyme in other areas in Arizona is thought to be extremely low), and Rocky Mountain spotted fever. Tick-Borne Relapsing Fever is a very rare disease in Arizona, and the disease causing spiral-shaped bacteria are transmitted by a soft tick in the genus *Ornithodoros*.

Chiggers are a part of the Arizona landscape and generally more prevalent during the monsoon season. Chiggers do not burrow under the skin, but their feeding can cause irritation and discomfort. Chiggers attach themselves to the skin surface, hair follicles or pores, using very short and delicate mouthparts. The bite is painless, but during feeding, they inject an irritating fluid which breaks down skin tissues, they can then feed by sucking up the liquefied tissues. Chiggers drop off rapidly on their own accord or can be washed off in a soapy bath. Itching is usually noticeable after several hours. Some people are sensitive to bites and can suffer severe swelling, itching, and fever. Symptoms can last a couple of weeks.



CHOOSING A BUG REPELLENT

Personal repellents are available in various forms and concentrations. Aerosol and pump-spray products are often intended for skin applications as well as for treating clothing. Liquid, cream, lotion, spray, and stick products facilitate direct application to the skin. Products with a low concentration of active ingredient may be appropriate for situations where exposure to biting arthropods is minimal. Higher concentration of active ingredients may be useful in highly infested areas. Always practice non-chemical ways to deter biting bugs—window and door screens, bed netting when camping, wearing long sleeves, and long pants.

USING PERSONAL REPELLENTS SAFELY

The Environmental Protection Agency (EPA) recommends the following precautions when using personal repellents:

- Apply repellents only to exposed skin and/or clothing (as directed on the product label). Do not use under clothing.
- Never use repellents over cuts, wounds, or irritated skin.
- Do not apply to eyes and mouth, and apply sparingly around ears. When using sprays do not spray directly onto face; spray on hands first and then apply to face.
- Do not allow children to handle the products, and do not apply to a child's hands. When using on children, apply to your own hands and then apply it to the child.
- Do not spray in enclosed areas. Avoid breathing a repellent spray, and do not apply it near food.
- Use just enough repellent to cover exposed skin and/or clothing. Heavy application and saturation is generally unnecessary; if biting bugs do not respond to a thin film of repellent, then apply more.
- After returning indoors, wash treated skin with soap and water or bathe. This is particularly important when repellents are used repeatedly in a day or on consecutive days. Also, wash treated clothing before wearing it again. If you suspect that you or your children are reacting to a repellent, discontinue use, wash treated skin, and then call your local poison control center if symptoms persist. Arizona Poison and Drug Information Center: 1-800-222-1222. If you go to a doctor, take the repellent with you. Reactions to repellents usually take the form of burning or irritated skin where the repellent has been applied.



- Get specific medical information about the active ingredients in repellents and other pesticides by calling the National Pesticide Information Center (NPIC) at 1-800-858-7378. NPIC operates from 6:30am to 4:30pm pacific time Monday through Saturday. The NPIC Web site is: <http://npic.orst.edu/>

IMPORTANT INFORMATION ON USING REPELLENTS

- Check the container to ensure that the product bears an EPA-approved label and registration number. Never use a product that has not been approved for use by EPA!
- Read the entire label before using a repellent. Even if you have used it before, read the label again - don't trust your memory.
- Follow the use directions carefully. Use only the amount directed, at the time and under the conditions specified, and for the purpose listed. For example, if you need a tick repellent, make sure that the product label lists this use. If ticks are not listed, the product may be ineffective.
- Store repellants away from children in a locked utility cabinet.
- The use of clip-on repellent devices that use battery-powered fans to circulate repellent around the body, are not recommended.
- Outdoor foggers, candles, and coils have not been found to be effective.
- Insect Repellent Wristbands have not been found to be effective.
- Studies have demonstrated that electronic mosquito repellents are useless, and that some can even increase the number of mosquito bites people receive.

TYPES OF REPELLANTS

According to the Centers for Disease Control and Prevention (CDC) the three most common active ingredients in repellents are DEET, picaridin, and oil of lemon eucalyptus. The CDC considers DEET and picaridin to be the most effective. Between the two active ingredients, picaridin products are less problematic when used repeatedly, over an extended period of time.

EPA characterizes the active ingredients DEET and Picaridin as conventional repellents and Oil of Lemon Eucalyptus, PMD, and IR3535 as bio-repellents, which are derived from natural materials. For more information on repellent active ingredients see (http://www.epa.gov/pesticides/health/mosquitoes/ai_insectrp.htm).

CONVENTIONAL REPELLENTS

- **DEET (N,N-diethyl-m-toluamide or N,N-diethyl-3-methyl-benzamide)** is the active ingredient in many personal repellent products.

If DEET gets into the eyes, it can cause irritation, pain and watery eyes. People that have left DEET products on their skin for extended periods of time have experienced

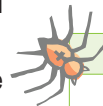
irritation, redness, a rash, and swelling. Washing repellents off regularly is important.

People that have swallowed products containing DEET have experienced stomach upset, vomiting, and nausea. Very rarely, exposure to DEET has been associated with seizures in people. Most of these reactions have happened after drinking products with DEET in them or using the products in ways that do not follow label directions.

Products containing DEET are currently available to the public in a variety of liquids, lotions, sprays, and impregnated materials (e.g., wrist bands). Formulations registered for direct application to human skin contain DEET concentrations ranging from 4 to 100%. DEET is designed for direct application to human skin. Skin sensitivity to DEET can develop after repeated use. If at all possible, use an alternative repellent on a child, or products that contain lower levels (<6%) of DEET, or apply to the child's clothing and not onto their skin. Do not use DEET on infants or if you are pregnant.

The longevity of protection afforded by the repellent will vary depending upon a number of environmental factors. As a general rule the higher the temperature the shorter the protective period will be. Swimming, sweating and sun screen will also affect longevity. General guidelines are given below:

DEET impregnated wrist bands have not proven to be effective at protecting the entire body.



Amount DEET	Approx. Hours of Protection
30%	6.5
15%	5
10%	3
5%	2

Off Deep Woods

(SC Johnson)

23.8% DEET

301.5 minutes of protection time



Off Skintastic for Kids

(SC Johnson)

4.75% DEET

88.4 minutes of protection time



- **Picaridin (KBR 3023, Chemical Name: 2-(2-hydroxyethyl)-1 piperidinecarboxylic acid 1-methylpropyl ester)**

Products containing picaridin are very effective against many species of mosquitoes. Picaridin is slightly toxic by eye, dermal and oral routes, but is not a dermal sensitizer. Products are virtually odorless and have a very light feel.



Cutter Advanced

(Spectrum)

7.00% picaridin

150 minutes of protection time

BIO-REPELLANTS

• IR3535 (3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester)

IR3535 is a chemical repellent that has been used in Europe for over 20 years, IR3535 was approved for use in the United States in 1999. Toxicity tests show that the IR3535 is not harmful when ingested, inhaled, or used on skin, although it may cause eye irritation if it enters a person's eyes.

Skin So Soft Bug Guard

(Avon)

IR3535

22.9 minutes of protection time



• Citronella and Lavender Oil

It is recommended that personal repellents such as citronella and oil of lavender not be used on children under 2 years of age. Oil of citronella shows little or no toxicity, but may cause skin irritation.

Registered citronella oil repellents protect people against mosquito bites for 20 minutes or less. Slow release products do not provide significant added benefit. Similarly, the registered lavender oil repellent protects for half an hour or less.

Based on animal studies, citronella-based products appear to be potential dermal sensitizers. Therefore, allergic reactions may occur in some individuals.

• Oil of Lemon Eucalyptus Oil (P-menthane diol; PMD)

Products containing eucalyptus oil were the most effective biorepellents tested and lasted as long as low concentrations of DEET

Repel Lemon Eucalyptus Insect Repellent

(WPC Brands)

oil of lemon eucalyptus

94.6 minutes of protection time

Fite Bite Plant-Based Insect Repellent

(Travel Medicine)

oil of lemon eucalyptus

120.1 minutes of protection time

According to the label, oil of lemon eucalyptus products should NOT be used on CHILDREN UNDER 3 YEARS.

• Soybean Oil

Soybean oil is made from soybeans and is a common ingredient in food. When USDA researchers tested the success of a soybean oil repellent, they found that it provided protection from bites for hours, depending on the species of mosquito they studied. Evaluations of soybean oil used as a pesticide have found few hazards.

Bite Blocker for Kids

(HOMS)

soybean oil

94.6 minutes of protection time

PESTICIDE PRODUCT USED WITH PERSONAL REPELLENTS

• Permethrin

Apply on clothing only
NEVER apply directly to the skin



These products may be used alone or with skin applied repellents. Permethrin is a contact insecticide; it kills ticks, mosquitoes, or other bugs when they come into contact with treated clothing. It is used on tents, clothing and materials only. **Skin contact must be avoided and deactivates permethrin within fifteen minutes.** As a clothing, tent or sleeping bag application, permethrin is very effective at keeping ticks from attaching to you and at reducing mosquito bites. Permethrin is also an effective repellent against mosquitoes and other biting flies, and can be used in conjunction with a skin repellent. Spray applications of permethrin can remain effective up to 14 days of exposure to light or oxygen, or through two aggressive washings. By storing the treated clothing in black plastic bags between uses, the fourteen days of protection can be extended considerably. If necessary a heavier application can remain effective even longer. Bed nets can be treated with permethrin.

Only consider using a permethrin based repellent in high-risk situations, where disease vectoring is a concern.

REFERENCE

Product data has been taken from:

- Fradin M.F., Day J.F. 2002. Comparative efficacy of insect repellents against mosquito bites. *New England Journal of Medicine*. 347(1):13-8.
- Barnard, D.R. and R. Xue. 2004. Laboratory evaluation of mosquito repellents against *Aedes albopictus*, *Culex nigripalpus*, and *Ochlerotatus triseriatus* (Diptera: Culicidae). *J. Med. Entomol.* 41(4):726-730.
- Carlos F. S. Andrade, C.F.S. and Isaiás Cabrini, I. 2010. Electronic Mosquito Repellers Induce Increased Biting Rates in *Aedes aegypti* Mosquitoes. *Journal of Vector Ecology* 35 (1): 75-78.

