

# Choosing the correct repellents



## Louisiana State University Agricultural Center

Only female mosquitoes feed on blood because they require those nutrients to produce eggs. A female will lay from a few eggs to a couple hundred in a single location that contains, or will contain standing water. Over sixty kinds of mosquitoes in Louisiana vary tremendously in their habits, and as a group they take advantage of almost any accumulation of water you can imagine, from a discarded potato chip bag to huge salt marshes. That said, water that is moving swiftly, highly disturbed, very polluted, or deep, does not usually support mosquito development. When the mosquito eggs receive their cue, such as flooding of the habitat, they hatch into larvae and feed on small particles and microorganisms. The length of the larval stage depends greatly on temperature and species. It can occur in as little as five days during which time they continue to feed and grow. Before they are ready to emerge as adults, the larvae develop into pupae, which look a lot like a comma shape. This stage is quite short, about two days before the adults emerge. Shortly after emerging, they find mates and repeat the cycle. Do what you can to protect yourself by following the 3 R's: **Remove** the source on your own property, **reduce** the risk of exposure, and use the right **repellent**.

### Removing the Source

When people are bitten by mosquitoes it usually means the source of standing water is nearby. If you are getting bitten, the first course of action is to check your yard for standing water. Anything that holds water for seven days or more can produce mosquitoes, even containers as small as a bottle cap. Store tires and other containers inside, empty standing water from buckets, bird baths, and pet dishes weekly, chlorinate pools, drill holes in the bottom of trashcans, make sure

gutters are not clogged, and that drain pipes slope downward. There are low risk products you can buy to kill larvae in sites you cannot remove. These either contain a toxin from bacteria that only kills mosquitoes, or an insect hormone that prevents their development.

### Reducing the Risk

You can reduce the risk of getting bitten by putting distance between you and the mosquito. One way is to simply not be in the same place as the mosquitoes, by avoiding those places or times when mosquitoes are abundant. Another way is to erect barriers between yourself and the biting horde. Good screens on windows and doors (at least 22 meshes per linear inch) can do wonders for protecting you in the house and while you sleep. While outdoors, wearing long sleeves, long pants, and a hat will prevent many bites, especially if you use cloth such as twill and ripstop (rather than knits). Another trick is to wear a layer under the outer layer as mosquitoes do not like the way the layers rub against each other.

### Use a Repellent

The Centers for Disease Control (CDC) recommends repellent products that contain active ingredients which have been registered with the U. S. Environmental Protection Agency (EPA). When the EPA registers a repellent, they evaluate the product's efficacy and potential effects on humans and the environment. Therefore, if a repellent is EPA registered, the EPA does not expect the product, when used according to the label instructions, to cause unreasonable adverse effects to human health or the environment. When selecting a repellent,

look for EPA-registered products that provide protection time information on the product label. Important things to consider include: the insects you want protection from, the length of time you need protection, the active ingredient, the percentage of active ingredient, the kind of product (lotion, aerosol, etc.), the container type, and any safety and usage instructions that will be listed on the label.

## How to Apply

You should always read the label before applying a repellent. Always apply the repellent correctly on your child and never let a child apply repellent alone. Apply repellents as directed by the label. Some repellents are used on the skin, whereas other types are applied to clothing only. Never apply repellents underneath clothing, over cuts, wounds, or irritated skin. Never spray a repellent directly on your face, instead spray your hands first, and then apply to your face. Do not allow children to handle products. Apply repellent to your own hands and then to your child's skin. Do not spray aerosol or pump products in enclosed spaces. Also, take advantage of the effectiveness of skin repellents applied on clothing. A little repellent on the socks, across the shoulders, or on a hat can really help.

## Active Ingredients

Four of the active ingredients on the market are approximately equivalent in effectiveness. Those active ingredients are DEET, Picaridin (Bayrepel or KBR 3023), p-menthane-diol (PMD, or oil of lemon eucalyptus), and IR3535. Both the type of formulation and percentage of active ingredient contribute to the duration of protection times. For a more accurate estimate on protection times, refer to the product label. Generally speaking, any formulation of DEET over 50% does not gain any longer protection time.

Protection time will vary. Sweating and getting wet might mean you need to reapply more frequently. Always follow the label before reapplying. Several products such as wristbands, have not been shown to provide any protection from biting mosquitoes.

### Protection Times Against Mosquitoes

1-2 Hours	2-4 Hours	5 to 8 hours
Less than 10% DEET	10 to 20% DEET	20 to 50% DEET
Less than 10% Picaridin	10 to 20% Picaridin	
Less than 10% PMD	30 to 40% oil of lemon eucalyptus	

## Bug Zappers and Repellers

University studies have repeatedly shown that ultrasonic repellers (emit high frequency sound) and bug zappers (bugs attracted to light are electrocuted) do not reduce mosquito numbers. In fact, blacklight bug zappers can actually increase the number of bites you receive in the backyard. Other commercial traps based on production of carbon dioxide, heat, dog-heart sounds, and octenol actually can work if there are enough traps and few enough mosquitoes. Unfortunately, it is unlikely that putting a trap in your backyard will keep you from getting bit.

## Permethrin Based Products

Certain products containing permethrin are recommended for use on clothing, shoes, bed nets, and camping gear, and are registered with the EPA for these uses. Permethrin is highly effective as an insecticide and as a repellent. Permethrin treated clothing repels and kills ticks, mosquitoes, and other arthropods. Permethrin also retains its repellent effects after repeated laundering. Permethrin should be reapplied following label instructions. Some commercial products are available pretreated with permethrin. When visiting tick infested areas, wear light colored clothing and tuck your pant legs into your socks as this will make ticks more visible. Also, remember that permethrin treated clothing will give you no protection on adjacent skin. Therefore, you will still need repellent.

## Are Natural Products Safe?

The word "Natural" is often misleading. Products that are "natural" mean that they are derived from plants. These oils have evolved with the plants to defend the plant from insect feeding. Therefore, these oils can be toxic and irritating in high concentrations. It is important to recognize that a "natural" repellent does not necessarily mean they are "safe" repellents. Many of the natural repellent products provide protection around 30 minutes or less. Do not use a repellent that does not have an EPA registration number.

## How Repellants Work

Repellents interfere with a mosquito's ability to detect you. They may come near based on visual cues and body heat, but they generally will not bite because the final human "flavor" is absent to them. Some products, like mosquito coils, work on a different principle and just irritate or kill any mosquitoes that come into the cloud of product. These products help outdoors as long as the wind is not strong.

## Frequently Asked Questions (FAQ)

Are products combining sunscreen and repellent just as effective?

Sunscreen products and repellents interact with each other, so it is difficult to know how each works in the presence of the other. Generally, you don't need mosquito repellents when you need sunscreen because mosquitoes are most active as the sun sets and rises. When applying both, it is recommended you apply the sunscreen first, followed by the repellent.

Can I use repellents on my child?

Always read the label carefully before applying a repellent to a child. The American Academy of Pediatrics (AAP) recommends that repellents with DEET should not be used on infants less than two months of age. The AAP has not issued recommendations regarding the use of Picaridin or oil of lemon eucalyptus. According to the product label for oil of lemon eucalyptus, it should not be used on children under three years of age. For skin applied products, always apply the repellent to your own hand first, and then rub it onto your child's skin. Avoid eyes and mouth, and use sparingly around the ears. Do not apply under clothing.

Can I use repellents if I am pregnant?

If you are pregnant and concerned about using repellents, you should consult your health care provider if you have questions. Other than routine precautions noted earlier, EPA does not recommend any additional precautions when using registered repellents on pregnant and lactating women.

What if I have a reaction to a repellent?

The use of repellents may cause skin reactions in rare cases. Most products also note that eye irritation can occur if the product gets into the eyes. If you suspect a reaction to a product, discontinue use, wash the treated skin and call a poison control center (800-222-1222). If you go to a doctor, take the repellent container with you.

## References

Bartlett-Healy, K., and G. C. Hamilton. Protecting yourself from mosquito bites. Rutgers Fact Sheet FS1125. 2010.

U. S. Environmental Protection Agency: [www.epa.gov/opp00001/health/mosquitoes/insectrp.htm](http://www.epa.gov/opp00001/health/mosquitoes/insectrp.htm)

Centers for Disease Control: [www.cdc.gov/ncidod/dvbid/westnile/repellentupdates.htm](http://www.cdc.gov/ncidod/dvbid/westnile/repellentupdates.htm)

American Academy of Pediatrics: [www.healthychildren.org/English/safety-prevention/at-play/Pages/Insect-Repellents.aspx](http://www.healthychildren.org/English/safety-prevention/at-play/Pages/Insect-Repellents.aspx)



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