School & Home Integrated Pest Management (IPM) Newsletter – July 2017

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Mosquito and Tick Repellents

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Introduction

Personal repellents (often referred to as "**bug sprays**") are substances applied to skin, clothing, or other surfaces to repel or discourage insects and other arthropods such as ticks from feeding on humans. Repellents help people avoid bites from mosquitoes, ticks, and other biting arthropods that may transmit disease-causing pathogens, and allow them to engage freely in outdoor activities.

Mosquitoes and ticks are medically significant pests that affect the health and wellbeing of Arizona residents. They can cause a variety of health problems due to their ability to vector (transfer) viruses and other disease-causing pathogens. Southern house (*Culex quinquefasciatus*), western encephalitis (*Culex tarsalis*), and yellow fever (*Aedes aegypti*) mosquitoes are of greatest concern to most people. Mosquito-vectored diseases of humans include West Nile fever and St. Louis encephalitis. Emerging diseases of concern include dengue fever, chikungunya, and Zika. Different mosquitoes vector specific diseases, for more information see https://cals.arizona.edu/apmc/docs/Gouge-Mosquitoes_arboV.pdf. Many mosquito species are not vectors of any human disease-causing pathogens.

Other than mosquito vectors, brown dog ticks (*Rhipicephalus sanguineus*), and “soft ticks” (*Ornithodorus*) are the most important in-state disease vectors. Brown-dog ticks vector *Rickettsia rickettsia*, which causes Rocky Mountain spotted fever, and soft ticks vector *Borrelia* bacteria which causes tick-borne relapsing fever. Lyme disease is caused by the bacteria *Borrelia burgdorferi* and is vectored by the western black-legged tick (*Ixodes pacificus*), which is found only in the higher elevations of the Hualapai Mountains. Gulf Coast ticks (*Amblyomma maculatum)* have been found to vector *Rickettsia parkeri* in Arizona. The American dog tick (*Dermacentor variabilis*) and Rocky Mountain wood tick (*Dermacentor andersoni*) found in northern Arizona are also vectors of *Rickettsia rickettsia*, and the bacterium *Francisella tularensis* the bacterium that causes Tularemia.

West Nile fever is currently the most common vector-borne disease affecting humans in Arizona. The elderly are at a higher risk of suffering severe medical symptoms. Between 2010-2015, the CDC reported an average of 2,376 West Nile cases in the continental U.S. per year (around 100 each year in Arizona). The number of cases varies greatly in the continental U.S.

year to year and, sadly, an average of 125 deaths occur annually. **These deaths are preventable.**

Arizona is also home to a number of biting flies, including biting midges, black flies, horse flies, and deer flies which can inflict painful bites that cause irritation that persists for days. Chiggers are immature Trombiculidae mites, and generally are more prevalent during the monsoon season. Chiggers do not burrow under the skin, but cause irritation and discomfort by feeding on the skin surface. Chiggers attach themselves to the skin surface, hair follicles or pores, using very short and delicate mouthparts. Bites from some of these organisms are relatively painless, but during feeding, they inject an irritating fluid that may cause itchy, uncomfortable reactions.

Application of repellents to the skin is a common personal protection practice. The effectiveness of this technique, however, depends on many factors. This article provides details about how to choose a repellent, details on the different types of repellents, and advice on how to use personal repellents safely.

Choosing a Personal 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. A higher concentration of active ingredients is often useful in highly infested areas. In addition to repellent use, always practice non-chemical ways to deter biting arthropods, such as window and door screens, bed netting when camping, and light-colored clothing with loose fitting long-sleeves, long pants and socks. Use protective clothing when exposure to mosquitoes or ticks cannot be avoided (Gouge et al. 2016). However, ticks are very capable of moving inside clothing layers.

Be aware that most repellents are not effective against stinging insects (bees, wasps, hornets, etc.) or bed bugs.

Before selecting a repellent, here is what you need to consider:

1) Do you need protection from mosquitoes, ticks or both?
2) How long (in hours) will you need protection?
3) What will you be doing (consider heat, sun, and water exposure)?
4) Who is using the repellent? If applying repellent to children, be aware that not all repellents are appropriate for young children

A convenient tool for selecting a repellent is available at https://www.epa.gov/insect-repellents/find-repellent-right-you.

Using Personal Repellents Safely

Properly apply repellents even if you are outside for just a short period of time, and share your repellent with those around you. Most repellents are classed as pesticides, and must be registered by the U.S. EPA. Repellent product labels give specific use instructions that should be followed carefully.

Most mosquito repellents work by reducing overall attraction of the blood-seeking female mosquito to the human host. However, manufacturer longevity estimates may not be a reliable guide. Temperature and activity level can dramatically influence how long repellents remain effective. Some repellents containing permethrin actually kill biting pests on contact.

The Centers of Disease Control and Prevention (CDC) recommend the use of products registered with the EPA: those containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products are well established as the most effective active ingredients of repellents. In general, repellents containing a higher percentage of the active ingredient typically provide longer-lasting protection.

The following is a list of precautions recommended by CDC and EPA:

- Apply repellents only to exposed skin and/or clothing (as directed on the product label). Do not apply repellents under your clothing.
- Never use repellents over cuts, wounds or irritated skin.
- Do not apply to eyes or mouth, and apply sparingly around ears. When using repellent sprays, do not spray directly on your face—spray on your hands first and then apply to your face.
- Do not allow children to handle or spray the product. When using on children, apply to your own hands first and then put it on the child. Avoid applying repellent to children's hands because children frequently put their hands in their eyes and mouths.
- Use just enough repellent to cover exposed skin and/or clothing. Heavy application does not give you better or longer lasting protection.
- 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.
- If you (or your child) get a rash or other reaction from a repellent, stop using the repellent, wash the repellent off with mild soap and water, and call a local poison control center for further guidance. If you go to a doctor, it might be helpful to take the repellent with you.
- Products containing oil of lemon eucalyptus should not to be used on children under the age of three years.
- Do not apply repellent on babies under 2 months old. Use mosquito netting or avoid mosquito habitats in which you are likely to encounter mosquitoes as much as possible. Most products specify the youngest age allowable for a given product.
- Do not spray in enclosed areas. Avoid breathing in a repellent spray, and do not spray products near food.
- Using repellent and sunscreen products at the same time is an acceptable practice. In general, the recommendation is to apply sunscreen first, followed by repellent. Combination products that contain both an insect repellent and a sunscreen have improved greatly in recent years, but as repellents do not need to be reapplied as often as sunscreen, combination products are best used if outdoor activities are limited to a few hours.
- Wash treated clothing before wearing it again.
- EPA does not recommend any additional precautions for repellent use by pregnant or nursing women.

- Get specific information about repellents and other pesticides by calling the National Pesticide Information Center (NPIC) at 1.800.858.7378, or email npic@ace.orst.edu or visit http://npic.orst.edu/ingred/ptype/repel.html.

Important Information on Using Repellents

- Read the entire label before using a repellent. Even if you have used it before, read the label again - product directions change.
- 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 (Figure 1).

  If ticks are not listed, the product may be ineffective. Be aware of repellency awareness graphics https://www.epa.gov/insect-repellents.
- Store repellents away from children in a locked utility cabinet.
- The effectiveness of outdoor foggers, candles, and coils is highly variable and depends largely on the active ingredients and specific design.
- Insect Repellent Wristbands have not been found to be effective.
- Studies have demonstrated that ultrasonic mosquito repellers are ineffective, and that some can even increase the number of mosquito bites people receive (Carlos et al. 2010).

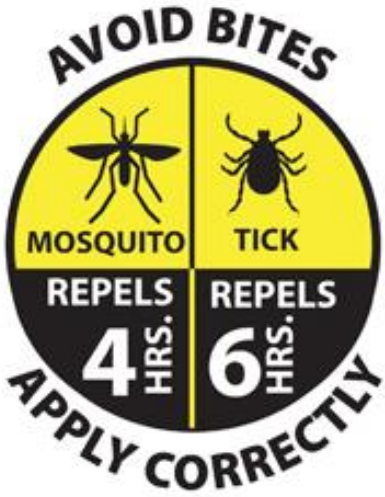

Figure 1. The Repellency Awareness Graphic shown here indicates that the product will protect against both mosquito and tick bites. However, not all products do.

Types of Repellents

According to the CDC, of the products registered with the EPA, those containing DEET, picaridin, oil of lemon eucalyptus, IR3535, and para-menthane-diol provide longer-lasting protection. Reactions to DEET are uncommon, but picaridin products are less likely to trigger dermal reactions.

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 https://www.epa.gov/insect-repellents/skin-applied-repellent-ingredients.

Please read more in the article “Mosquito and Tick Repellents” https://cals.arizona.edu/apmc/docs/Mosquito-and-Tick-Repellents.pdf.

Webinars and Events

Please join in for the 2017 All Bugs Good and Bad Webinar Series. This webinar series provides information about good and bad insects. Webinars are free and open to everyone. Webinars will be on the **first Friday of each month at 2 p.m. Eastern time**.

Upcoming webinars include:

1. Drain Flies, House Flies, and Fungus Gnats - August 4, 2017
2. Meet Our Native Pollinators - September 1, 2017
3. New Invasive Ants to Know About - October 6, 2017

For more information about upcoming and past School IPM webinars:
http://articles.extension.org/pages/74016/2017-all-bugs-good-and-bad-webinar-series.

For more information about the EPA Schools program, visit:
http://www.epa.gov/schools/

For more information about Community IPM, visit:
http://www.extension.org/pages/23359/urban-integrated-pest-management-community-page

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For more information about School IPM in Arizona, visit:
http://cals.arizona.edu/apmc/westernschoolIPM.html

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https://cals.arizona.edu/apmc/public-health-IPM.html#newsletter

https://cals.arizona.edu/apmc/westernschoolIPM.html#newsletter

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