

**Fight the bite: preparing for mosquitoes and Zika virus - 2016**



According to the CDC Zika webpage (<http://www.cdc.gov/zika/geo/united-states.html>), 358 travel-associated cases of Zika virus disease have been confirmed in the US as of April 13, 2016. No case has been identified as being acquired locally. Three (3) of the reported cases were from Kentucky.

Here are some frequently asked questions about mosquitoes and Zika in Kentucky:

Does *Aedes aegypti*, the main vector of the Zika virus, occur in Kentucky?

*Aedes aegypti* is the species that is most likely to spread viruses like Zika, dengue, and chikungunya. Fortunately, it is very rare in Kentucky. The map (Fig 1.) shows the Centers for Disease Control (CDC's) estimated range of *Aedes aegypti* based on where it is known to occur or has been found in the past.

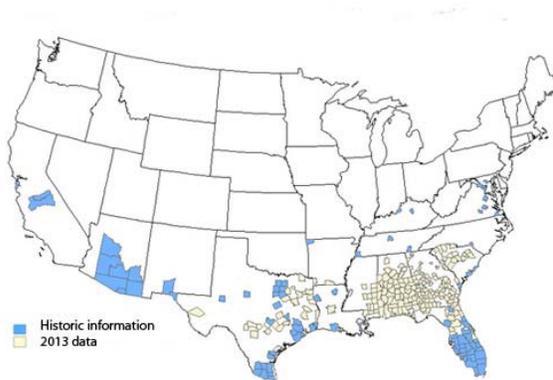


Fig 1. Approximate distribution of *Aedes aegypti* in the US\* (CDC map)

This map was developed using currently available information. *Ae. aegypti* mosquito populations may be detected in areas not shaded on this map, and may not be consistently found in all shaded areas. Blue = historic data, light yellow = 2013 information.



Are there any mosquitoes in Kentucky that could carry Zika?

*Aedes albopictus*, the Asian tiger mosquito (ATM), occurs throughout the state and would be a species of importance should local transmission occur.

Fig 2. The Asian tiger mosquito has white bands on its legs and a white stripe down the center of the thorax (Photo Center for invasive species research UC-Riverside)

### What are its feeding habits?

Asian tiger mosquitoes are outdoor (garden) mosquitoes. These aggressive, day-biters are especially active during the early morning and late afternoon. The species is responsible for most of the mosquito bites that occur in Kentucky city suburbs.

The ATM feeds opportunistically on a variety of mammals. Humans, dogs, and cats are common hosts in urban areas. Wildlife and livestock become important in rural settings. Fortunately, this variety of hosts reduces its effectiveness as a vector of Zika. In contrast, the yellow fever mosquito tends to feed on humans, increasing the chance that it can infect a person during its second meal.

### Where do they develop?

Asian tiger mosquito females lay their eggs on the sides of most any natural or artificial container and the eggs will hatch if the water remains for 10 days or more. Example sites include discarded tires, pet water bowls, animal watering troughs, birdbaths, clogged gutters, flowerpots, etc.



Fig 4. Maple seedlings are a good indication of standing water on this flat roof.



Fig 5. Gap around downspout entry to rain barrel gives mosquitoes access to water.



Fig 6. Keep pet water clean.



Fig 7. Accumulated water in tires is an excellent breeding site for Asian tiger mosquitoes.

### How long is the life cycle?

Development depends on temperature, usually 7 to 12 days during the summer. Adults live about 3 weeks. There are several generations each summer with peak numbers from mid-August through September.

### How far do ATM travel?

These mosquitoes usually stay within about 250 yards of their breeding site so you can do a lot to minimize problems by eliminating breeding sites on your property.

### Where are these mosquitoes found?

ATM prefer to rest on thick, dense vegetation and feed on nectar when they are not seeking blood meals. Recent control strategies have involved treating landscape vegetation with a residual insecticide to increase control. (See Vegetation treatments below)

#### **Mosquito management**

##### **1. Breeding sites - Reduction, biological, and chemical control**

Source reduction is the key to managing mosquito populations. Since the Asian tiger mosquito stays near its breeding site, removing accumulations of water on or near your property is the key to reducing nuisance and potential public health problems. Chemical and biological control options may be needed for sites that cannot be removed.

##### Permanent water - ponds, fountains, and water gardens

Mosquito larvae prefer water that is less than 24 inches deep and have gently sloping banks. When possible, keep water deeper than 24 inches with steep drop-offs along the edge. Remove excess



vegetation and organic debris that provide mosquito larvae with food, shelter from the sun, and hiding places from predators. Stock with surface feeding fish when possible or use an aerator to keep the water surface disturbed.

Fig 8. A few fish in an outdoor water feature will deal with mosquito larvae.

*Bacillus thuringiensis israelensis* (Bti) toxin is formulated into granules or blocks (Mosquito Dunks) for application to standing water. A specific bacterial toxin is released which is ingested by developing mosquito larvae. The toxin breaks down the gut lining of mosquito larvae so they starve. These products can be effective for 30 days or longer. Check the label for use sites – fish habitats, tree holes, bird baths, animal watering troughs, old tires, roof gutters, rain barrels. These products are widely available. They are not for use in drinking water or swimming pools.

Methoprene is an insect growth regulator that disrupts development of mosquito larvae (Mosquito Torpedo). As with Bti products, they can be used in many types of standing water, including animal watering troughs but not in drinking water or swimming pools.

##### **2. Adult control**

Screening of decks and patios will exclude adult mosquitoes. Fans that keep air moving will deter mosquitoes.

##### Vegetation treatments

Treatment of mosquito resting sites with pyrethroid insecticides can cut down on biting by the ATM. UK research has demonstrated that products containing bifenthrin or I-cyhalothrin reduce biting by ATM for 4 to 6 weeks compared to untreated properties. The length of protection depends on weather conditions. This approach may be justified in overgrown or very shady areas where mosquitoes continue to be a problem even with aggressive reduction/removal of breeding sites or if there is a threat of mosquito-borne disease. Pyrethroids are very toxic to pollinators so they must not be applied to blooms. This approach may result in unnecessary exposure of people to insecticide residues.

### 3. Personal protection

Asian tiger mosquitoes feed on any exposed skin surface so clothing is an important protective barrier. Wear a long-sleeved shirt, long pants, and socks when the mosquitoes are active.

Repellents, applied according to label instructions, can protect bare skin. They are chemicals that interfere with mosquito host-finding or feeding. They can protect people from bites if used according to label directions. The Centers for Disease Control recommends using products that have been shown to work in scientific trials and that contain active ingredients which have been registered with the Environmental Protection Agency (EPA) for use as insect repellents on skin or clothing. When EPA registers a repellent, they evaluate the product for efficacy and potential effects on human beings and the environment. EPA registration means that EPA does not expect a product, when used according to the instructions on the label, to cause unreasonable adverse effects to human health or the environment.



Fig 9. Repellency awareness graphic (US EPA)

EPA is allowing companies to apply for permission to include the new repellency awareness graphic on product labels of skin-applied insect repellents. This graphic is intended to help consumers easily identify the repellency time for mosquitos and ticks. Use of the graphic by manufacturers will be voluntary and available for qualifying companies. EPA will review products that apply to use the graphic to ensure that their scientific data meet current testing protocols and standard evaluation practices.

Use this search tool to find the repellent that is right for you: <https://www.epa.gov/insect-repellents/find-insect-repellent-right-you>. You can specify the: target pest, protection time desired, active ingredient, or other product-specific information.

EPA registered repellents:

DEET (N,N-diethyl-m-toluamide) repels mosquitoes, biting flies, and ticks. The content in products varies from low (~10%) to high (~50%). Higher concentrations provide longer periods of protection and are more effective against higher biting pressure. Products containing DEET have a greasy feel and an odor. 10% DEET protects for about 2 hours.

Picaridin is registered as a skin and clothing application to repel mosquitoes, biting flies, ticks, and chiggers. 10% products give about 3 hours of protection.

Oil of lemon eucalyptus (30% OLE or PMD) derived from the leaves of the lemon eucalyptus tree, repels mosquitoes. 40% concentration protects for about 6 hours

IR3535 (3-[N-butyl-N-acetyl]-aminopropionic acid) Skin-So-Soft products. 15% concentration protects for about 4 hours.

There are insect repellent products for sale in the U.S. that do not have to be registered by EPA because the amounts of active ingredients in the products were determined to pose minimal risk to human health. Examples are citronella oil, cedar oil, geranium oil, peppermint and peppermint oil, and soybean oil.