

Florida Container Mosquitoes¹

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What Are Container Mosquitoes?

As the name implies, container mosquitoes are those that develop in a variety of water-holding containers, both natural and artificial. Examples of natural containers include tree holes, bromeliad leaf axils, and bamboo trunks. Artificial containers include a variety of man-made receptacles such as discarded tires, cans, flower pots, bird baths, pet dishes, and many, many others. There are about 13 species of container mosquitoes in Florida. Many of these are important vectors of pathogens that can cause disease in humans and companion animals, and others are severe nuisance species. Because of the ease of manipulating and replicating the habitat, container mosquitoes have served as model systems for numerous studies and experiments on ecology and community biology.

Mosquitoes are insects belonging to the order Diptera (from the Greek *di*= two, *pteron* =wing), which includes flies, mosquitoes, gnats, midges, sandflies, horse flies, and others. As their name implies, the Diptera have only one pair of functioning wings instead of two; the hind wings have been reduced to small club-like appendages known as halteres. There are approximately 167 species of mosquitoes in the United States, out of which 80 species occur in Florida. Mosquitoes have scales on their wings and the females possess a long piercing proboscis.

The mosquito life cycle (Figure 1) includes an egg stage, several aquatic larval stages (instars), a pupal stage, and an adult. Female mosquitoes lay their eggs individually or in groups known as rafts.

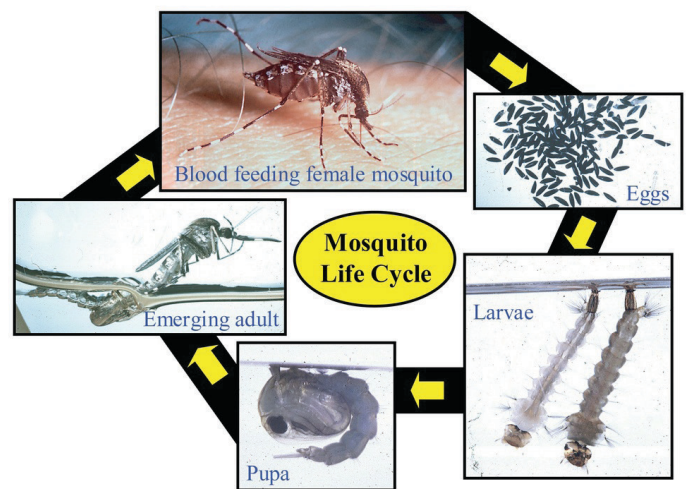


Figure 1. Mosquito life cycle.

Some mosquitoes (floodwater mosquitoes) lay their eggs in moist substrates without standing water and hatch when subsequently flooded, whereas others place the eggs directly upon the surface of the water or along the edges of pools or reservoirs. Both male and female adult mosquitoes will feed on nectar and plant fluids, but it is only the female that will seek a blood meal, which most species need in order to develop their eggs. Female mosquitoes lay multiple

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Use pesticides safely. Read and follow directions on the manufacturer's label.

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batches of eggs and most species require a blood meal for every batch they lay. Females of some species can develop a limited number of egg batches (usually 1) without taking a blood meal, a characteristic known as “autogeny” (Rey 2006).

Florida Container Mosquitoes

The major container species in Florida are:

Aedes aegypti (Linn.)—Yellow fever mosquito (Figure 2). Common container mosquito that will feed during the daytime indoors and out. Common in urban and suburban areas. The species can transmit yellow fever, dengue, chikungunya and Zika viruses, and the nematode that causes dog heartworm. This species is present throughout the state of Florida.



Figure 2. *Aedes aegypti*.
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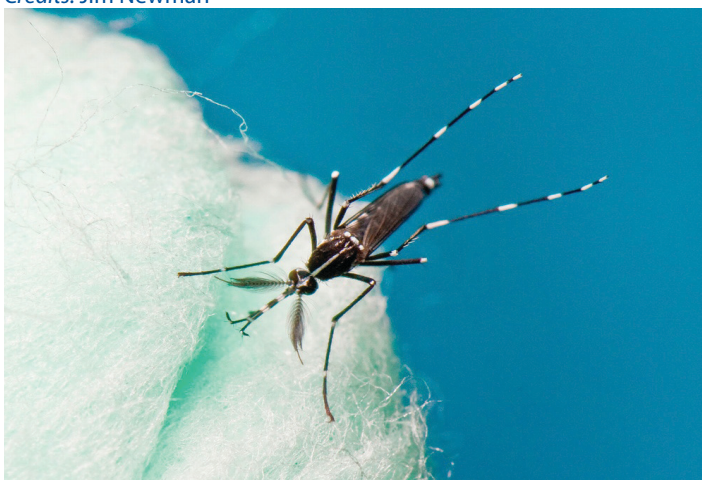


Figure 3. *Aedes albopictus*.
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Aedes albopictus (Skuse)—Asian tiger mosquito (Figure 3). Similar habitat requirements as the yellow fever mosquito, although may be more common in suburban and rural areas. This exotic, invasive species can be found in every

Florida county; however, it has not been able to establish long-term populations in the Florida Keys.

Aedes taeniorhynchus (Wiedemann)—Black salt marsh mosquito (Figure 4). This species is not known as a typical container mosquito but it may infrequently take advantage of such sites if available. The species is predominantly a salt/brackish marsh inhabitant. It can bite day or night and can transmit dog heartworm. Even though this is primarily a coastal species, it can be found throughout the state of Florida.



Figure 4. *Aedes taeniorhynchus*.
Credits: Jim Newman

Aedes triseriatus (Say)—Eastern treehole mosquito (Figure 5). Larvae develop primarily in tree holes but will breed in water barrels and other artificial containers. *A. triseriatus* is a primary vector of LaCrosse encephalitis, and will bite any time of day. This species can be found in most Florida counties, however, LaCrosse encephalitis is very rare in Florida (CDC 2016).



Figure 5. *Aedes triseriatus*.
Credits: Jim Newman

Anopheles crucians Wiedemann—This species normally breeds in semi-permanent and permanent pools, ponds, lakes, and swamps, but larvae can sometimes be found in tree holes. It bites primarily at night and is a secondary or suspected vector of malaria, Venezuelan equine encephalitis, and equine encephalomyelitis. This species can be found throughout the state of Florida.

Culex atratus Theobald. This species has a limited distribution in coastal southwestern Florida.

Cx. nigripalpus Theobald (Figure 6)—This is arguably the most important disease vector in Florida. It can transmit St. Louis encephalitis, West Nile and eastern equine encephalitis viruses, and dog heartworm. Larvae inhabit ditches, pools, dairy lagoons, swales in citrus groves, and artificial containers. It is normally a night biter. *Cx. nigripalpus* occurs through the entire state of Florida, often in abundance.



Figure 6. *Culex nigripalpus*.
Credits: Jim Newman

Cx. peccator Dyar and Knab. *Cx. peccator* has been reported from several Florida counties throughout the state, primarily in central Florida, but never in abundance.

Cx. quinquefasciatus Say—Southern house mosquito (Figure 7). Common in polluted waters with high organic content, including containers, ditches, drains and catch basins, animal waste ponds, watering tanks, cesspits, and others. Mostly a night biter, but will bite indoors. This species can vector the viruses that cause West Nile and St. Louis encephalitis, although it is a secondary vector in Florida. *Cx. quinquefasciatus* occurs throughout the entire state.



Figure 7. *Culex quinquefasciatus*.
Credits: Jim Newman

Deinocerites cancer Theobald—Crabhole mosquito (Figure 8). Breeds in holes of land crabs but larvae have been found in containers on rare occasions. They feed mainly on birds, but will feed on mammals and reptiles if needed. They seldom bite humans and have not been implicated in disease transmission. This species can be found primarily on coastal counties in southeastern Florida.

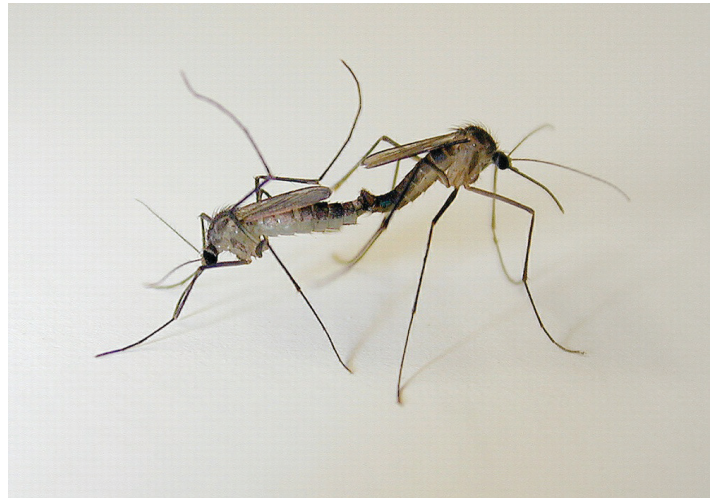


Figure 8. *Deinocerites cancer*.
Credits: Jim Newman

Toxorhynchites rutilus (Coquillett)—Elephant mosquito (Figure 9). The larvae are predatory on other mosquito larvae and can be cannibalistic. Adults of these species are the largest in North America and are covered with iridescent scales. The females do not feed on blood, and, therefore, are not a concern for disease transmission. Males and females

feed on nectar and other sources of sugar for energy. *Tx. rutilus* is wide-spread in Florida, but not abundant.



Figure 9. *Toxorhynchites rutilus*.
Credits: Roxanne Connelly

Wyeomyia mitchellii (Theobald)—Bromeliad mosquito. This mosquito develops in the waters held in bromeliad leaf axils. It feeds during the day and can be a serious nuisance where tank bromeliads such as *Billbergia* spp. are common. This mosquito species is wide-spread in the state of Florida.

Wyeomyia vanduzeei Dyar and Knab (Figure 10). This mosquito also develops in the waters held in bromeliad leaf axils. It is a day biter not known to transmit any important diseases. The distribution of this species is limited to the distribution of bromeliad plants, and occurs throughout the southern peninsula of Florida.



Figure 10. *Wyeomyia vanduzeei*.
Credits: Jim Newman

Note that in the above descriptions we have listed the most common characteristics of the species but exceptions always occur. For example, predominantly night biting mosquitoes will bite during the day, especially in shady areas or during heavy overcast. It is also important to remember that in Florida the risk of disease transmission is never zero regardless of individual mosquito vector abundances.

Control of Container Mosquitoes

Source reduction—The most effective method for control of container mosquitoes is source reduction, which means eliminating the places where they breed (Table 1). Small containers such as disposable plastic containers, cans, and others should be picked up and properly disposed. Containers that are in use such as pet dishes and bird baths should be flushed with clean water at least once per week to eliminate the immature stages of mosquitoes breeding there. Some container mosquitoes will also reproduce in small water holding depressions on the ground and in isolated pockets of drainage and irrigation ditches; to prevent breeding, the former should be filled and graded and the latter should be kept clear of vegetation and obstructions to water flow.

Water holding areas of trash/debris piles and clogged roof gutters also provide breeding habitats for mosquitoes and should be cleaned-up. Do not overlook debris accumulations on rooftops and other out of the way places. Debris and other water-holding objects such as tires piles and small boats that cannot be removed or stored indoors should at least be covered to keep them dry and inaccessible to mosquitoes. Bromeliads and other water holding plants should be flushed regularly with clean water; tree holes can be filled with sand or cement to prevent water accumulation.

Biological Control—Mosquitoes can be kept at bay in larger containers such as rain barrels and ornamental ponds by using biological control agents including predatory fish such as *Gambusia* spp. (Kern 2004), and/or predaceous copepods (Rey and O'Connell 2004). Formulations of the bacterium *Bacillus thuringiensis israelensis* (Bti) can be purchased commercially, are very effective in controlling larval mosquitoes, and are not harmful to fish, waterfowl, pets or humans when used according to label directions.

Chemical Control—When other types of control are impractical, chemicals designed to kill mosquito larvae (larvicides) can be used. Most of these available to homeowners contain the chemical methoprene.

References

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Table 1. Preventing mosquito breeding around the home.

LOCATION	SOLUTION
Potted plants with pans	Do not overwater, remove pans if possible.
Drainage ditches	Remove vegetation and obstructions to water flow
Low spots that hold water	Fill and regrade
Plugged roof gutters	Keep gutters clean
Pet dishes	Change water frequently
Trash piles	Remove or cover
Stored tires	Remove or cover
Poorly maintained pools	Follow recommended maintenance
Bromeliads	Flush to remove larvae
Debris on roof	Remove debris
Ponds	Keep clean, stock with fish
Boats	Cover or turn upside down
Bird baths	Flush at least once per week
Discarded containers	Dispose properly