

The Asian Tiger Mosquito in Florida ¹

G. F. O'Meara²

Prior to 1985, the distribution of *Aedes albopictus*, the Asian tiger mosquito, was confined to Asia and many islands in the Pacific Ocean, including some of the Hawaiian Islands. Yet, in recent years the range of this mosquito has greatly expanded to include North and South America, Africa and Europe.

The Asian tiger mosquito (ATM) was most likely introduced into North America through the importation of used tires from Japan or Taiwan. During the 1980s there was a large increase in the number of used tires imported into the United States from countries where ATM is indigenous. Most imported used tires come to the United States in containerized shipments that are not adequately inspected for mosquitoes at the ports of entry. Imported tires are sent to numerous locations where they may be stored outdoors. Those that are not suitable for recapping may end up at illegal dump sites. These conditions have enabled ATM to become well-established in the United States. To date, ATM is known to occur in 25 states extending from Texas and Florida in the south to New Jersey and Nebraska in the north.

In 1986, the ATM was initially discovered in Florida at a tire dump site in Jacksonville (Duval County). Over the next 8 years, this exotic mosquito spread to all of Florida's 67 counties (Figure 1). Currently, it is the dominant *Aedes* mosquito in artificial containers throughout Florida. An exception to this pattern occurs in the Florida Keys where the Yellow Fever mosquito (YFM), *Aedes aegypti*, has a widespread distribution but where there are, as yet, no ATMs.



Figure 1.
Factors Contributing To The Spread Of *Aedes albopictus*

- The widespread availability of suitable aquatic habitats

1. This document is ENY632, one of a series of the Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date September 1997. Revised July 2005. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.
2. G. F. O'Meara, professor, Florida Medical Entomology Laboratory, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Vero Beach, FL 32962.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. U.S. Department of Agriculture, Cooperative Extension Service, University of Florida, IFAS, Florida A. & M. University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Larry Arrington, Dean

- The movement of containers
- The decline of *Ae. aegypti* populations
- The rapid adaptation of *Ae. albopictus* to shorter photoperiods

Aquatic Habitats

Although immature ATM mosquitoes inhabit many different types of containers, scrap tires probably harbor this mosquito more frequently and in greater numbers than any other type. Major pest problems caused by ATM are often associated with accumulations of scrap tires. Approximately 15 million waste tires are generated yearly in Florida. To deal with this solid waste problem, the Florida Department of Environmental Protection has established new regulations concerning the storage, movement, and disposal of waste tires. Authority to issue the so-called Waste Tire Rule is provided in Section 403.717 of the Florida Statutes, passed in 1988 and amended in 1990. If vigorously enforced, the new regulations on waste tires will eventually diminish the availability of used tires as habitats for ATM and related mosquitoes.

Other common man-made habitats for immatures of the ATM include bird baths, water bowls for pets, buckets, plates under potted plants, clogged rain gutters and vases used to hold fresh-cut or silk flowers. Natural containers, such as treeholes and tank bromeliads, also provide suitable habitats for the ATM. Indeed, this mosquito shows a much greater propensity for using natural containers than does YF.

Movement Of Containers

Although most scrap tires are eventually brought to a state-approved disposal site, far too many waste tires end up at these locations only after being retrieved from illegal dump sites. Improper storage and delays in shredding waste tires has contributed to the spread of ATM. Some of the early invasion sites for ATM in Florida were at regional scrap tire disposal locations which were receiving tires already infested with this mosquito. Delays in shredding tires allowed these sites to serve as focal points for the spread of ATM to new areas.

In more than a dozen Florida counties, the initial discovery of ATM was made at cemetery sites. Plastic floral baskets with fresh cut flowers are often placed at a grave site at the time of burial. After a few days, the wilted flowers are discarded, but the baskets are usually recycled. They may return to the same or to a different cemetery holding either fresh or silk flowers. Mosquito eggs laid while the basket is in one cemetery may hatch in another. This invasion route may explain why the ATM became well-established in some cemeteries before appearing in nearby accumulations of waste tires.

Decline In *Aedes aegypti* Populations

The spread of the ATM seems to have occurred at the expense of resident YFM. The abundance of the YF mosquito in several Florida cities declined drastically and rapidly with the introduction of the ATM. Several theories have been proposed to account for the apparent displacement of YF by the ATM. However, additional field studies are needed to more clearly document the types of habitats and the geographical regions in which populations of YF mosquitoes have undergone a decline and to assess the role ATM mosquitoes may have had in bringing about these changes. In southern parts of both Florida and Texas, YF mosquitoes have continued to thrive in some habitats long after the arrival of the ATM. Since the two mosquito species inhabit the same types of artificial containers, a decline in one species would make more resources available for the other species.

Adaptations To Shorter Photoperiods

Initially, eggs of the ATM in North America would not hatch when the day length was less than 13.5 hours. This is one of several factors which suggest this mosquito invaded the continental United States from the temperate region of Asia. Probably due to its temperate origin, the ATM quickly spread in the temperate zone of central and eastern United States. In contrast, this mosquito was relatively slow in spreading to lower latitudes. For the ATM to remain active in south and central Florida during a significant portion of the year where day lengths for

much of the year are less than 13.5 hours, the mosquito had to lower the day length threshold or eliminate the response to day length. Rapid selection for both of these features has occurred in the ATM in peninsular Florida and, throughout much of Florida, this mosquito is now active year around.

Distinguishing Asian Tiger And Yellow Fever Mosquitoes

Adult AT and YF mosquitoes are active during the daytime. They usually can be distinguished with ease in the field by differences in the patterns of the scales on their backs (Figure 2). In addition, the clypeus, a structure located on the head between and above the proboscis, is covered with white scales in female YF mosquitoes and with only black scales in female ATM. Scales on the back may be rubbed off, especially in specimens taken in traps; whereas the scales on the clypeus are seldom missing.

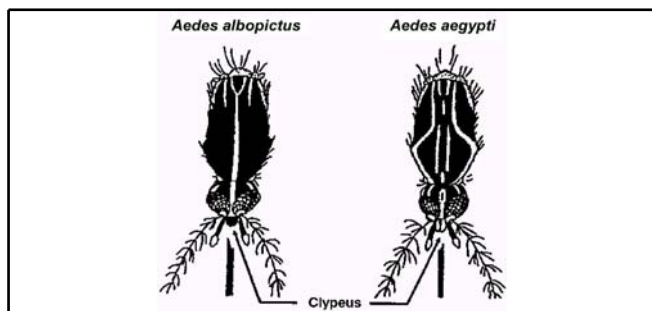


Figure 2.

Larvae of the two species can be distinguished by differences in the shape of their comb scales, the size of their thoracic spines and the number of branches in seta 7-C on their heads (Figure 3). These structures can only be seen using a stereomicroscope that magnifies 40 to 50 X and a good light source.

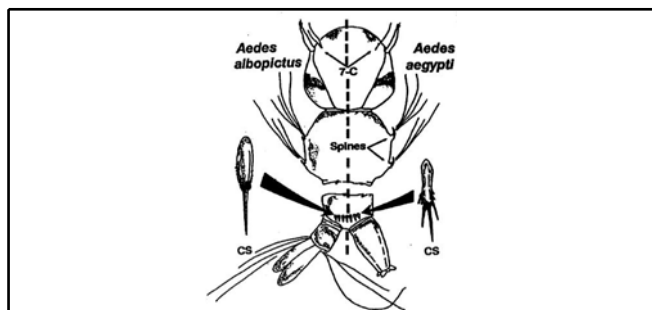


Figure 3.

Status Of Asian Tiger Mosquito As A Pest And Vector Of Disease

The ATM has quickly become a serious pest species in many Florida communities where the annoyance level generated by populations of this mosquito is considerably greater than that caused previously by YFM. The wider range of habitats occupied by the ATM would tend to make it generally more common than YF mosquitoes.

In Florida, the Asian Tiger Mosquito has not been implicated in the transmission of any human pathogens. However, elsewhere it is a major vector of dengue and yellow fever. Results of laboratory tests indicate that the ATM is capable of serving as a vector for several other viruses that are pathogenic to man or animals.

Control

The best approach for controlling AT and YF mosquitoes is by eliminating larval habitats. With improved legislation and better informed citizens, it should be possible to greatly reduce the abundance of container-inhabiting mosquitoes throughout Florida. Current requirements for the storage of waste tires are grossly inadequate for mosquito abatement. The waste tire rule should be revised to require that all tires be stored in dry areas.

Educational programs which inform citizens about the important role they can play to prevent mosquito production in containers around their homes, should be expanded and offered on a continuing basis. By eliminating unneeded containers and by frequently emptying the water in other containers (e.g ., bird baths and pet-watering dishes) around their homes, residents can complement the control efforts of the local mosquito control program.

Achieving permanent mosquito control in natural containers, such as tank bromeliads, may be more difficult. Therefore, homeowners should consider limiting the number of these plants that they place in their yards. Chemical and microbial larvicides may provide temporary control, but generally they are not cost effective. Mosquitoes and plant debris can be flushed out of tank bromeliads with a garden hose equipped with an appropriate nozzle. It is unlikely

that plants flushed once or twice a week would produce many adult mosquitoes. Growing bromeliads in plastic pots makes it easier to flush out the mosquitoes.