

BACKGROUND HISTORY

APM MOSQUITO CONTROL (APM) was established in 1986 and has evolved into the largest privately-owned mosquito management company in southeast Michigan. APM Mosquito Control implemented and maintains mosquito management programs in multiple townships and cities throughout SE Michigan. Private services to homeowner associations, golf courses, special events, weddings and parties are available.

THE MOSQUITO STORY

Mosquitoes (Order Diptera, Family Culicidae) are some of the most adaptable and successful insects on earth and are found in some extraordinary places. Virtually any natural or man-made collection of water can support mosquito production.

Mosquitoes can be distinguished easily from other flies by the fact that they have both a long, piercing proboscis and scales on the veins of their wings. About 60 species are found in Michigan. Only a few of these are important as carriers of disease, but many others are significant nuisances. The two most common mosquito species found in Michigan are *Aedes vexans* and *Culex pipiens*. *Aedes vexans* are known as the floodwater mosquito because it lays its eggs on dry-ground in flood prone areas. *Culex pipiens* are an important disease vector, known to spread St. Louis Encephalitis.



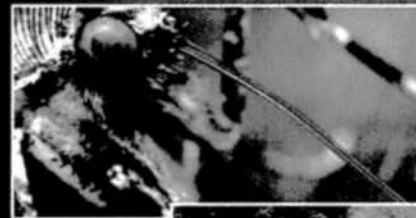
INTEGRATED MOSQUITO MANAGEMENT

A process consisting of the balanced use of environmentally compatible and economically feasible products to reduce mosquito populations to a tolerable level. APM develops and implements comprehensive integrated Mosquito Control programs, tailored specifically to the customers needs. The basis of every APM Mosquito Control program is biological larval control. All potential mosquito larval habitats are surveyed, cataloged and mapped. Routine larval surveys are then scheduled to determine where larvae are developing and what actions need to be taken to control them. Adult mosquito populations are also sampled using a network of light traps. These surveillance activities allow APM Mosquito Control to plan and implement larval and adult Mosquito Control applications in a manner consistent with Integrated Mosquito Management (IMM) protocols.

The primary objective of IMM is to prevent the development of mosquito larvae by using biological methods, thus minimizing the need to "fog" for adult mosquitoes. The use of ULV [ultra-low volume] fogging gives good but only temporary results under acceptable weather conditions and is not generally cost effective as a sole means of control. Biological larval control methods take advantage of natural enemies to reduce mosquito populations. Natural enemies fall into 3 categories: those that prey on mosquitoes, parasitize them, or act against their hormonal system. APM uses biological control in all three areas.

Bti (*Bacillus thuringiensis var. israeliensis*) is a naturally occurring spore and crystal forming soil bacteria. Bti's active ingredient has been shown to be toxic only to mosquitoes, blackflies and closely related species, with no toxic effects on other aquatic organisms. A Bti application in mid to late April to lowland/ woodland areas will be the initial step of the township integrated Mosquito Control program. Mosquito Control activities are limited to specific political boundaries, but unfortunately adult mosquitoes don't obey lines on a map. Thus, any program that hopes to have effective control must contend with local larval development and invading migratory adults.

Nature has provided no successful alternative to chemical insecticides for controlling adult mosquitoes. The controlled application of ULV insecticides using modern technology and equipment can effectively reduce adult mosquitoes utilizing extremely small amounts of insecticide. An EPA approved Mosquito Control product is applied via truck-mounted equipment at 10-30 ounces per acre. Permethrin and Sumethrin based insecticides are a man-made version of the natural botanical insecticide pyrethrin. These products offer excellent effectiveness against adult mosquitoes, low mammalian toxicity, low odor, and rapid biodegradability.



MOSQUITO LIFE CYCLE

All mosquito species have two things in common, they must have water for their early stages and they all undergo the same four-stage life cycle: egg, larva, pupa and adult.

Mosquito eggs are laid individually or in clusters and are deposited either on the water surface or in flood prone areas. Most mosquitoes over-winter in the egg stage. If eggs are laid out of water, embryos may lie dormant for several years. Once the egg hatches, the larval stage begins. The larvae of most mosquito species hang suspended at the water surface using an air tube to breathe. The larvae feed on aquatic organisms near the surface. As a defense mechanism, the larvae can dive deeper into the water by swimming in a characteristic "S" motion. Larvae grow quickly and outgrow their exterior covering. Larvae molt four times. Larval stages last between 5 and 14 days depending on temperature and food availability.

No feeding occurs in the pupae stage that lasts from 1 to 4 days, after which the pupae skin splits along the back allowing the newly formed adult to slowly emerge and rest on the water surface.

Male mosquitoes will emerge first and linger near the breeding site waiting for the females. Mating occurs quickly after emergence due to high mortality. Up to 30% of the adult male population may die per day. The female compensates for this by laying large numbers of eggs, usually about 300. Males live about 7 days and feed on plant nectars. Females live about 6 weeks and must take a blood meal to nourish her eggs. She uses carbon dioxide, exhaled chemicals, and temperature patterns to locate her victims.

The average female's flight range is between 1 and 10 miles, but some species have been shown to travel up to 40 miles. After each blood meal the female will oviposit her eggs, completing the life cycle. Several ovipositions per female are possible.