

Mosquito Control

Mosquito control can be divided into two areas of responsibility: individual and public. Most often it's performed following the **Integrated Mosquito Management (IMM)** concept. IMM is based on ecological, economic and social criteria and integrates multidisciplinary methodologies into pest management strategies that are practical and effective to protect public health and the environment and improve the quality of life. Mosquito control includes mosquito surveillance measures, source reduction, a biological control strategy, ground and aerial application of insecticides and public education. The applications of adulticides or larvicides are made after the presence of mosquitoes has been demonstrated by surveillance procedures. Application is made by prescribed standards. All insecticides must have the name and amount of active ingredient (AI) appear on the label; examples are DEET and pyrethroids. Check the label before buying. No pesticide is 100 percent safe and care must be exercised in the use of any pesticide. Material Safety Data Sheets (MSDS) contain basic information about a product intended to help you work safely with the material (<http://www.msdssearch.com/>). Other IMM strategies are employed in concert with insecticide. These include source reduction, which incorporates physical control (digging ditches and ponds in the target marsh) and biological control [placing live mosquito fish (*Gambusia*) in the ditches and ponds to eat mosquito larvae]. Other non chemical control methods include invertebrate predators, parasites and diseases to control mosquito larvae. Adult mosquito biological control by means of birds, bats, dragonflies and frogs has been employed by various agencies. However, supportive data is anecdotal and there is no documented study to show that bats, purple martins, or other predators consume enough adult mosquitoes to be effective control agents.

Adult Mosquito Control

Repellents. Repellents are substances that make a mosquito avoid biting people. Persons working or playing in mosquito-infested areas will find repellents very helpful in preventing mosquito bites (<http://www.plymouthmosquito.com/repell.htm>). Repellents are formulated and sold as aerosols, creams, solids (sticks) and liquids. Use repellents containing ingredients such as diethyl phthalate, diethyl carbate, N, N-Diethyl-3-Methylbenzamide (DEET), and ethyl hexanediol. For more than 40 years, DEET has been the standard in mosquito repellents. Check the label for these active ingredients. Permethrin-containing repellents (Permanone) are recommended for use on clothing, shoes, bednets and camping gear. Permethrin is highly effective as an insecticide/acaricide and as a repellent. Permethrin-treated clothing repels and kills ticks, mosquitoes and other arthropods and retains this effect even after repeated laundering. Permethrin-treated clothing should be safe when label directions are followed. Permethrin repellents do not offer any protection from mosquitoes when applied to the skin. It is often helpful to use spray repellents on outer clothing as well as the skin. Protection generally may be expected up to 6 hours following application. Oil of citronella is another type of mosquito repellent for space repelling. Oil of citronella is the active ingredient in many of the candles, torches, or coils that may be burned to produce a

smoke that repels mosquitoes. These are useful outdoors only under windless conditions. Their effectiveness is somewhat less than repellents applied to the body or clothing.

<u>Here are some common sense rules to follow when using repellents:</u>
<ul style="list-style-type: none">• Wear long sleeve shirts and pants outdoors during peak mosquito activity time periods.
<ul style="list-style-type: none">• Apply repellent sparingly only to exposed skin or clothing.
<ul style="list-style-type: none">• Keep repellents away from eyes, nostrils and lips: do not inhale or ingest repellents or get them into the eyes.
<ul style="list-style-type: none">• Avoid applying high-concentration (>30% DEET) products to the skin, particularly of children.
<ul style="list-style-type: none">• Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
<ul style="list-style-type: none">• Pregnant and nursing women should minimize use of repellents.
<ul style="list-style-type: none">• Never use repellents on wounds or irritated skin.
<ul style="list-style-type: none">• Use repellent sparingly; one application will last approximately 4-6 hours. Saturation does not increase efficacy.
<ul style="list-style-type: none">• Wash repellent-treated skin after coming indoors.
<ul style="list-style-type: none">• If a suspected reaction to insect repellents occurs, wash treated skin, and call a physician. Take the repellent container to the physician.

Mosquito Traps. Insect electrocutors (bug zappers) and **mosquito trapping devices** are 20th century control measures. Manufacturers modernized 19th century mosquito trapping devices such as the New Jersey light trap with more “bells and whistles” to improve its appeal to the public. **Insect electrocutor light** traps have been extensively marketed for the past several years claiming they can provide relief from the biting mosquitoes and other pests in your back yard. Numerous devices are available for purchase that claim to attract, repel or kill outdoor infestations of mosquitoes. They should be thoroughly researched before being purchased.

Other **mosquito traps** are designed to mimic a mammal (horse, cattle, man and domestic pets) by emitting a plume of carbon dioxide, heat and moisture, which is often combined with an additional attractant, i.e. octenol, to create an attractant to mosquitoes, no-see-

ums, biting midges and black flies. After drawing the insects to the trap, a vacuum device sucks the insects into a net or cylinder where they dehydrate and die. No electric killing grid or pesticides are used.

Scientific data relative to the effectiveness of these devices is sparse so be sure to review all the information available before purchasing one of these. In addition, some of the mosquito traps are expensive. The **AMCA** has a position paper on mosquito traps (<http://www.mosquito.org/MosqInfo/Traps.htm>) .

Space sprays. Mosquitoes can be killed inside the house by using a flit gun (seldom used any longer) or a household aerosol space spray containing synergized pyrethrum or synthetic pyrethroids (allethrin, resmethrin, etc.). The major advantage of space treatment is immediate knockdown, quick application, and relatively small amounts of materials required for treatment. Space sprays are most effective indoors. Outdoors, the insecticide particles disperse rapidly and may not kill many mosquitoes. The major disadvantage of space spraying is that it will not manage insects for long periods of time.

Only insecticides labeled for flying insect management should be sprayed into the air. Best results are obtained if doors and windows are kept closed during spraying and for 5-10 minutes after spraying. Always follow directions on the label.

Outdoor Control. Homeowners, ranchers or businesses may use hand-held **ULV foggers**, portable or fogging attachments for tractors or lawn mowers for temporary relief from flying mosquitoes. Pyrethrins or 5% malathion can be fogged outdoors. Follow instructions on both the insecticide label and fogging attachments for application procedure.

Mechanical Barriers. Mosquitoes can be kept out of the home by keeping windows, doors and porches tightly screened (16-18 mesh). Those insects that do get into structures can be eliminated with a fly swatter or an aerosol space spray containing synergized pyrethrum.

Vegetation Management. Adult mosquitoes prefer to rest on weeds and other vegetation. Homeowners can reduce the number of areas where adult mosquitoes can find shelter by cutting down weeds adjacent to the house foundation and in their yards, and mowing the lawn regularly. To further reduce adult mosquitoes harboring in vegetation, insecticides may be applied to the lower limbs of shade trees, shrubs and other vegetation. Products containing allethrin, malathion or carbaryl have proven effective. Paying particular attention to shaded areas, apply the insecticides as coarse sprays onto vegetation, walls and other potential mosquito resting areas using a compressed air sprayer. Always read and follow label directions before using any pesticide.

Many of the mosquito problems that trouble homeowners and the general population cannot be eliminated through individual efforts, but instead, must be managed through an organized effort. Many states have some sort of **organized mosquito control**, either at the State, County or city level. Florida has over 50 organized mosquito control

organizations that specialize in area mosquito control. Some residential communities organize to control their mosquito problems. There has been an increase in the number of these organizations in the United States since the encephalitis outbreak in 1999. These organized management programs incorporate the IMM strategies mentioned above which include permanent and temporary measures. Permanent measures include impounding water and ditching, and draining swampy mosquito breeding areas. Temporary measures include treating breeding areas to kill larvae and aerosol spraying (ULV) by ground or aerial equipment to kill adult and larval mosquitoes. If you live within an organized mosquito management district, support it in its control efforts. Organized mosquito management can accomplish much more than individual efforts. If you are not sure about whether your community has a mosquito control district, contact the local division of health officials.

Larval Control

The most effective way to control mosquitoes is to find and eliminate their breeding sites. Eliminating large breeding areas such as swamps or sluggishly moving streams or ditches may require community-wide effort. This is usually a task for your organized mosquito control program. **Homeowners**, however, can take the following steps to prevent mosquito breeding on their own property:

1. Destroy or dispose of tin cans, old tires, buckets, unused plastic swimming pools or other containers that collect and hold water. Do not allow water to accumulate in the saucers of flowerpots, cemetery urns or in pet dishes for more than 2 days.
2. Clean debris from rain gutters and remove any standing water under or around structures, or on flat roofs. Check around faucets and air conditioner units and repair leaks or eliminate puddles that remain for several days.
3. Change the water in birdbaths and wading pools at least once a week and stock ornamental pools with top feeding predacious minnows. Known as mosquito fish, these minnows are about 1 - 1-1/2 inches in length and can be purchased or native fish can be seined from streams and creeks locally. Ornamental pools may be treated with biorational larvicides (*Bacillus thuringiensis* subsp. *israelensis* (Bti) or methoprene (IGR) containing products) under certain circumstances. Commercial products "Mosquito Dunks" and "Mosquito Bits" <http://www.summitchemical.com/default.htm> , <http://www.marchbiological.com/> containing Bti can be purchased at many hardware/garden stores for homeowner use. Recently, [Zodiac](#), a division of Wellmark International, developed "Preventative Mosquito Control" (PMC) product that kills developing mosquitoes using insect growth regulator (IGR) technology. Like "Mosquito Dunks" Zodiac's "Preventative Mosquito Control" can be found at many home/garden and pet specialty stores.
4. Fill or drain puddles, ditches and swampy areas, and either remove, drain or fill tree holes and stumps with mortar. These areas may be treated with the above Bti or methoprene products also.

5. Eliminate seepage from cisterns, cesspools, and septic tanks.
 6. Eliminate standing water around animal watering troughs. Flush livestock water troughs twice a week.
 7. Check for trapped water in plastic or canvas tarps used to cover boats, pools, etc. Arrange the tarp to drain the water.
 8. Check around construction sites or do-it-yourself improvements to ensure that proper backfilling and grading prevent drainage problems.
 9. Irrigate lawns and gardens carefully to prevent water from standing for several days.
 10. If ditches do not flow and contain stagnant water for one week or longer, they can produce large numbers of mosquitoes. Report such conditions to a Mosquito Control or Public Health Office. Do not attempt to clear these ditches because they may be protected by wetland regulations.
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