Controlling Biting Insects – Mosquitoes, Black Flies, No-See-Ums, Punkies, Sand Flies, Horse Flies, Deer Flies
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BITING INSECTS

MOSQUITOES
BLACK FLIES
NO-SEE-UMS
PUNKIES
SAND FLIES
HORSE FLIES
DEER FLIES

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MOSQUITOES

In addition to being well known pests, mosquitoes are the most important group of arthropods that transmit diseases to man and animals. Two of these, California encephalitis virus and dog heartworm, now are known to occur in Michigan. While both normally are animal diseases, they can be transmitted to humans, so mosquito control has become a matter of human and animal health as well as human comfort.

Because mosquito species differ in their habits and behavior, general control recommendations may have to be adapted to be effective against the species present in a given area. Some mosquitoes lay eggs on damp, or even dry, soil where they may survive many months before they are flooded by water and hatch. Others deposit eggs directly on water where they hatch within a short period of time. All species of mosquitoes require water for hatching eggs and development of immature stages. Some adults may fly several miles from the water where they develop while other species fly only one half mile or less.

The most effective and permanent method for controlling mosquitoes consists in eliminating stagnant and slow-flowing water by proper drainage, land fills, water management or a combination of these measures. Since many mosquito species fly a mile or more to obtain a blood meal, permanent control measures usually must extend out at least that distance from your home if effective control is to be achieved.

A formally organized and well operated community mosquito control organization is undoubtedly the most efficient way to attain permanent mosquito control. The cost of this type program and the large areas that it must include requires community-wide support and cooperation. Individual control efforts by themselves can provide only temporary relief from mosquito pests since the adults will continue to fly in from adjacent untreated areas. In the absence of a large scale mosquito abatement program, individual efforts must be repeated as required throughout the mosquito breeding season.

Whether or not you live in an area with an active community mosquito control program, you can do many things during the mosquito season to reduce mosquito problems in and around your home.

WHAT YOU SHOULD DO

1. Get rid of all trash items in your yard that hold water. Old tires, unused automobiles, automobile parts and kitchen appliances, tin cans, buckets, drums, bottles and other water-holding containers make ideal breeding sites for mosquitoes.

2. Empty your children's plastic wading pool at least weekly and store it indoors when not in use.

3. Repair leaky pipes and outside faucets and move trailer drain hoses frequently enough to prevent pooling of water.

4. Change the water and scrub vases holding flowers and cuttings at least each week–or grow plant cuttings in sand. Change water in outside bird baths and scrub them at least weekly. Empty watering pans of pets and domestic stock daily.

5. Fill in low areas in your yard or install drainage tile to prevent the ponding or puddling of water.

6. Keep rain gutters clean and eliminate standing water on flat roofs.

7. Stock ornamental ponds with fish or drain and clean them at least once each week during the spring, summer and early fall.

8. Fill in tree rot holes and hollow stumps with sand or concrete.

9. Remove water from stored boats and canoes at least once weekly or provide cover or storage facilities that will prevent water accumulation.

10. Provide tight, insect-proof covers for all permanent water containers such as wells, cisterns, septic tanks and cesspools.

CONTROL OF LARVAL MOSQUITOES

When it is not possible or practical to eliminate all mosquito producing-water from your property and adjacent areas, treat standing water with a suitable insecticide to kill larvae and pupae. Since approved insecticides (see table 1) do not provide the long-lasting effectiveness that had been possible with DDT or other chlorinated hydrocarbons, they must be applied more frequently. The frequency of application will vary with the mosquito species and local conditions but, in general, adequate treatment of mosquito larval habitats every 10 to 14 days during the mosquito season in Michigan will prevent emergence of adults. Recommended materials and the directions for their use are given in Table 1. In applying larvicides, be sure to treat water edges and other areas with emergent vegetation thoroughly since mosquito larvae and pupae are most numerous in those areas.

TABLE 1. MOSQUITO LARVAE CONTROL

Insecticide	Directions for Use in Pressurized Sprayer
Abate 4E	Mix insecticide with sufficient water to obtain good coverage of the area to be treated and apply mixture in a uniform spray at the rate of 1 fluid ounce of undiluted Abate 4E per surface acre of water. Repeat applications as necessary. Do not spray on food, forage or on pastureland. (Abate may have limited effectiveness in water containing excessive organic matter.)
Fuel Oil	Mix with a spreading agent (Triton X-100, T-Det-MC or any comparable material) - 1 tablespoon of spreader per gallon of fuel oil. Apply mixture in uniform spray to water surface at the rate of 2 to 3 gallons per surface acre of water. Use only high quality fuel oil. **Lubricating or used crankcase oils are not satisfactory substitutes and will not be effective.**
Flit MLO	Apply at the rate of 2 to 3 gallons per acre with sprayer adjusted to deliver a partial cone pattern rather than a solid stream. This insecticide emulsifies if it hits water surface at high velocity and effectiveness is markedly reduced.
	NOTE: Heavy growth of emergent or surface aquatic vegetation may reduce effectiveness of larvicide and necessitate increased dosage or more frequent treatment.

ADULT MOSQUITO CONTROL

Unless you treat or eliminate mosquito-producing water sites in an area larger than the flight range of the adult, you must supplement larval control measures with adult control procedures if you want to be free of these pests. In general you can use two approaches to thwart invasions of adult mosquitoes from nearby areas:

(1) Treat the vegetation in your yard with a residual insecticide to kill adult mosquitoes that remain there long enough to obtain a lethal exposure.

(2) Apply an insecticide mist or fog to the areas where the adults are resting or flying.

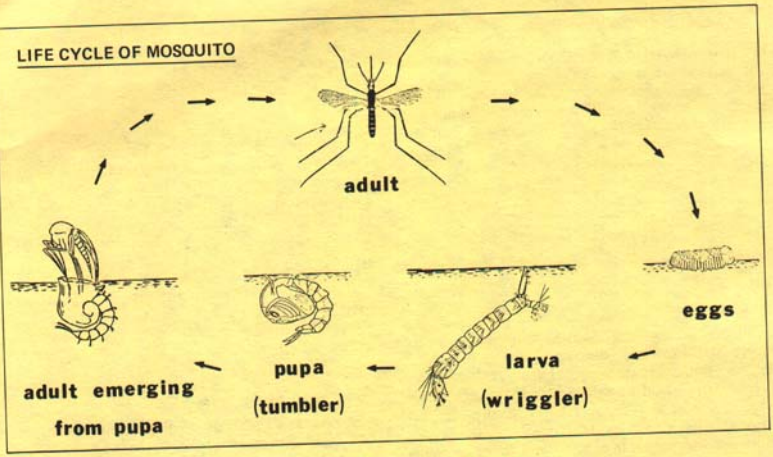
Approved chemicals for outdoor adult mosquito control in Michigan do not provide the long-term residual action of DDT and other persistent type insecticides. This means you must apply them more frequently in order to obtain comparable control. The frequency of application will vary with local conditions. Normally the residual treatment of vegetation in the yard with presently recommended insecticides will not persist long enough to be effective without supplemental treatment.

Misting or fogging is essentially aimed at killing the adult mosquitoes present only at the time of treatment and does not provide significant residual control. For this reason, misting or fogging must be repeated whenever the number of adults increases to a level where control is desired. Depending upon the nearness and extent of the mosquito breeding areas, the mist or fog produces satisfactory control ranging from an hour or two on up to several days. If control is not effective, persons may protect themselves with a mosquito repellent containing either diethyltoluamide (Deet), Indalone, dimethylphthalate or Rutgers 612. These are sold in a variety of formulations such as lotions, creams and aerosol sprays.

To control mosquitoes indoors, an aerosol space spray containing pyrethrum (pyrethrins) or allethrin is the most direct method and–if directions are followed–the most effective control. Under some conditions it may be more desirable to utilize the residual fumigant action provided by insecticide-impregnated resin strips. Specific recommendations for adult control are contained in Table 2.

TABLE 2. ADULT MOSQUITO CONTROL

Method of Application	Insecticide	Directions for Use
Residual outdoor spray for pressurized sprayers	57% Malathion emulsifiable concentrate	Mix 5 tablespoons of Malathion concentrate per gallon of water. Apply to grass, weeds, tree trunks and other vegetation and protected areas on outside walls and out-buildings where adult mosquitoes rest. Do not apply spray directly on ornamental plants.
Misting mixture	57% Malathion emulsifiable	Mix 5 tablespoons of Malathion concentrate per gallon of water. Direct mist into vegetation and wooded portions of the yard and surrounding areas. Also treat protected areas where vegetation is close to house foundation. Apply at the rate of 0.1 gallon per 1,000 square feet (5 gallons per acre). **NOTE:** Misting is most effective if applied during the period from dusk to dawn with winds less than 5 miles per hour. Effectiveness is greatly reduced during the hot part of the day or if wind is greater than 5 miles per hour.
Fogging mixture for use in thermal foggers	Malathion	Mix 6 fluid ounces of actual Malathion (e.g. 12 oz. of 50% Malathion or 6 1/3 oz. of 95% Malathion) per gallon of fuel oil. Apply fog at the rate of 1/2 gallon of mixture per acre. Direct fog along ground and into low vegetation where adult mosquitoes are resting. Fogging is effective only during cool hours from late evening to early morning when fog will hang and persist just above the ground level. Do not fog if wind is over 3 to 5 miles per hour. **NOTE:** Malathion may form a sludge when mixed with some types of fuel oil. Use of a cosolvent and sludge inhibitor may be required to avoid clogging fogger. Consult your insecticide dealer for specific information on the use of sludge inhibitors. Premixed ready-to-use Malathion formulations also are available from many dealers and may be preferred if mixing facilities are not available.
Indoor residual fumigation	Dichlorvos (DDVP or Vapona) resin strip	Hang strip(s) in enclosed area to control adult mosquitoes - 1 strip per 1,000 cubic feet of enclosed space. These strips are most effective in areas with minimum ventilation. They do not provide effective control if used outdoors or in well ventilated rooms since the Dichlorvos concentrations cannot reach effective levels under such conditions. (CAUTION: These strips are not registered for use where infants or aged persons are exposed to the insecticide vapor, or in kitchens, restaurants or other areas where food is prepared or served.)
Indoor aerosol space spray	Pyrethrum (pyrethrins) or Allethrin*	Use according to label instructions. **Commercial preparations have varying amounts of Pyrethrum or Allethrin and usually will include one or more additional chemicals to increase the insecticidal actions of these materials.*



SPECIFIC CONTROL PROGRAMS

Biting Midges

This group of biting flies includes several types of very tiny insects that are also called punkies, sand flies and no-see-ums. Those that bite humans are most bothersome in the evening and very early morning. Their bites cause a burning and irritation that is far greater than one would expect from so small an insect. They can become serious pests in localized areas. The limited flight range of the adults restricts their activities to localities near their breeding sites. They are weak fliers and are greatly inhibited by even light winds. You can encourage stronger wind currents, and thus reduce harborages for these insects, by keeping grass areas closely mowed, thinning out trees and shrubs and keeping shrubbery and low vegetation away from human and animal habitations.

Insecticide mists and fogs used for mosquito control also are effective on biting midges. These insects are attracted to light and their small size enables them to enter homes and other buildings by passing through window and door screens. An indoor aerosol containing either allethrin or pyrethrum (pyrethrins) will effectively eliminate adults indoors.

Most insect repellents do not prevent these insects from biting, but if applied in a thick enough film on the skin, a repellent may keep insects from reaching the skin surface. Lotions or creams are most effective.

Horseflies and Deerflies

Many species of this group are very common and bothersome pests in many low, moist areas of Michigan. Both horseflies and deerflies are strong fliers and are most abundant in swampy, forested localities from late May until September. They normally bite other large animals more readily than man but can become very bothersome human pests.

No satisfactory control has been developed for these insects since the extent of their breeding grounds in water and moist soil makes it impractical to treat them chemically, and their long flight range enables them to move freely in search of a suitable animal to feed on. Personal protection normally can be obtained by wearing suitable clothing and applying an insect repellent containing diethyltoluamide (Deet) to exposed skin.

Black Flies

Blackflies, sometimes called buffalo gnats, are small black or gray flies with stout, humpback bodies; short, broad wings and short legs. They feed on the blood of wild or domestic animals, including birds, and in some parts of Michigan are also vicious human pests. There is little precise information concerning their flight range but most species in Michigan can fly several miles from their breeding sites in streams and rivers. They bite only during the day but are persistent and may enter the ears, nostrils or crawl through openings in the clothing to feed on covered parts of the body. The only effective larval control ever developed for black flies involved the use of DDT. Alternate insecticides available in Michigan are virtually ineffective. Outdoor space sprays recommended for adult mosquito control also provide some local temporary relief from adults. Insect repellent applied to exposed skin combined with wearing tightly fastened clothing is probably the most effective protection against black fly bites.

INSECTICIDE DISPERSAL EQUIPMENT

One of the most important considerations in insect control is the proper selection, use and care of insecticide dispersal equipment. There are many kinds and sizes available. Selection should be made only after determining the types of insects to be controlled, the size of the areas to be treated and the types of insecticide that must be used.

Aerosol Dispensers

These self-pressurized containers discharge a fine insecticide spray through a push button nozzle. A spraying time of approximately 7 seconds per 1,000 cubic feet of space is usually sufficient to control flying insects within homes, tents or other habitations. A number of self-pressurized dispensers of *spray* type insecticides closely resemble aerosol dispensers

Read container labels carefully to be sure that you use only aerosol formulations as indoor space sprays. Spray dispensers produce much coarser particles that are not effective as space sprays and may also contain insecticides that are more hazardous to inhale than those in aerosol formulations.

Hand Sprayers

Small hand sprayers of the flit-gun type usually have a capacity of 1 to 3 quarts and are used principally to apply small amounts of insecticide within buildings.

Compressed Air Sprayers

Sprayers of this type usually have a capacity of 1 to 3 gallons and are probably the most useful and versatile piece of equipment available for both indoor and outdoor application of insecticides. Air is compressed in the sprayer by means of a built-in, hand-operated pump and the pressurized air forces insecticide out through the nozzle. These sprayers may be equipped with several types of nozzles that can be adjusted to deliver sprays ranging from a solid stream to very fine particles. During use, frequent pumping is required to maintain adequate spraying pressure. With proper care and maintenance this type sprayer will provide good service in small-scale insect control operations.

Foggers

Fogging machines are available in a variety of sizes, from portable machines weighing under 20 pounds on up to truck or trailer-mounted units that weigh several hundred pounds and can deliver up to 40 or more gallons of insecticide per hour. The smaller units may be powered by either an electric or gasoline engine while the larger ones have gasoline motors only.

Mist Blowers

Like fogging machines, mist blowers vary in size from small portable units of 2 to 4 quart capacity on up to truck mounted units holding several hundred gallons of insecticide. The selection of the unit best suited for your needs should be determined by the types of control operations planned and the size of the areas to be treated.

Mist blowers atomize the insecticide mixture into fine particles that are carried out in a strong blast of air. The distribution of insecticide is dependent upon the air blast primarily, but may be supplemented or extended by winds. Insecticide mists provide some residual effect in the control of insects but, as with fogs, depend primarily upon contact with the insect for their effectiveness.

CAUTION

All pesticides are poisonous and always must be handled in such a way as to minimize the possibility of harm to humans and others through contamination of food and water or by contact. The insecticides recommended in this publication were selected on the basis of their proven effectiveness in mosquito control and their relatively low hazard, *if used properly*, to users and the environment. The key to safety in the use of all pesticide chemicals is a knowledge of the hazards involved in handling and applying them. Know and follow these basic rules.

1. Know the material being used. Read the container label and understand the directions for preparing and applying the insecticide. Do not use more insecticide than is necessary. Excessive application increases costs and may be hazardous. **FOLLOW THE DIRECTIONS!**

2. Take special care not to inhale and contaminate skin and clothing when using insecticides. If insecticide is spilled upon the skin or clothes, immediately remove all contaminated clothing and thoroughly wash the exposed skin with soap and water. Prompt action can prevent serious poisoning or death. Always wash with soap and water after spraying or handling insecticide chemicals.

3. Avoid contaminating human and animal foods and drink with insecticides.

4. Keep spray equipment clean and in good operating condition. Dispose of insecticide rinsed from equipment only where it will not affect man or wildlife.

5. Store insecticides in properly labeled original containers that are kept out of the reach of children. **NEVER** store insecticides in food or beverage containers.

6. Dispose of empty insecticide containers safely (e.g. bury in a sanitary landfill) and never use these containers to store other materials.

7. In case of poisoning with insecticides, get the victim to a physician WITHOUT DELAY. If possible, take the container of the insecticide involved, with an intact label, to the physician so that he can determine the poison or poisons and prescribe the proper treatment. Immediate, proper and adequate treatment is essential.

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