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Mosquitoes: Management and Control*

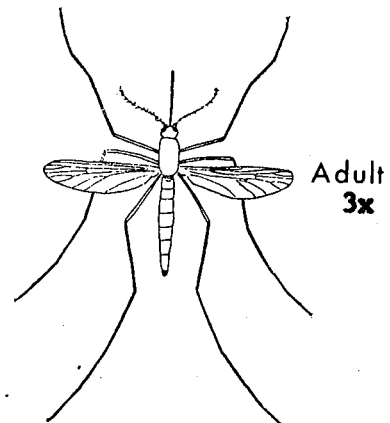
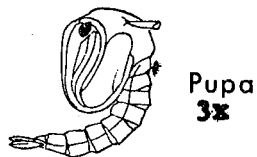
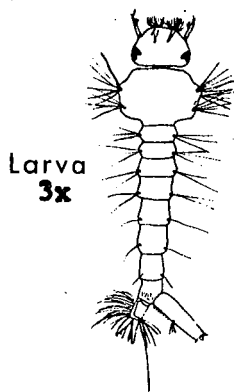
*By: George Berg & Byrna Weir
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Chemical Pollution

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Mosquitoes: Management and Control
Dr. George Berg and Byrna Weir



Summary

This bulletin gives various preventive measures for dealing with mosquitoes, as well as ways of repelling and killing them. Methods are presented in the order of safety to people and nature. Control by the home owner should begin with preventing the breeding of domestic mosquitoes. Chemical sprays are recommended as a last resort and only if they use minimum amounts of short-acting chemicals. Community-wide control should not be attempted without employing an expert and consulting local residents.

Introduction

There are ten major groups (genera) of mosquitoes in New York State, divided into some fifty species (3). The larvae of all fifty species can hatch and mature only if they are in water. The females of most species bite people. The breeding and feeding habits differ so greatly from species to species that a community program which controls one does not control another (7). This is why a community that wishes to control mosquitoes ought to employ an expert who can identify them, and who knows how to locate their breeding sites and resting places. Mosquitoes have survived area-wide spraying programs that killed beneficial insects and damaged fish.

Some measure of control can, however, be achieved rather simply by a property owner. For his purpose, mosquitoes can be divided into two groups: "household" mosquitoes, that breed locally in water puddles or in lawns and do not fly far, and "wild" ones that may bite far from their breeding grounds. The control measures are listed in order of safety to the user and to nature.

1. Preventive measures

A home owner ought to eliminate the breeding places of domestic mosquitoes. The following steps are taken from Travis (3):

- Eliminate all temporary water containers such as tin cans and old tires.
- Tightly cover all cisterns, water barrels, cesspools, and septic tanks.
Do not allow sewage or other liquid wastes to collect on the ground.
- Empty, wash, and refill bird baths and animal watering containers at least once a week.
- Keep rain gutters clean and flat roofs dry. (In Rochester, clogged parts of rain gutters are frequent breeding places.)
- Make weekly examinations of the containers in which plants are grown in water. If larvae are seen, dump the water, wash the plant roots and the containers, and refill with clean water.
- Keep the margins of small pools or ponds clear of plants that emerge through the water (leave the stems that are deep enough to be accessible to fish).
- Fill all tree holes with cement, or drain them.

Once the mosquitoes have emerged, they become harder to manage unless the area is screened. One gets fewer bites outdoors when the air is dry, sunny, windy and cold. Rochesterians tend to stay indoors at dusk, in still, moist, warm weather to avoid getting bitten. Some properties can be landscaped to deny mosquitoes their favorite daytime resting places. One recommendation involves pruning the foundation plantings to provide air circulation near the base of the house. Most gardens, however, have moist and shady places which the home owner will not want to sacrifice.

Birds are often referred to as an aid in controlling insects (1). R.C.S.I. would like to hear from readers who have had some success in attracting insect-eating birds to a property in the Rochester area.

Mosquitoes are attracted toward dark clothing and floral perfumes. Hence one can reduce the chance of being bitten by wearing light colored clothing and avoiding perfumes. Yellow light bulbs are less attractive to insects than white light bulbs, hence the use of so-called "insect repellent" light bulbs in lighted areas will tend to attract fewer mosquitoes than ordinary light bulbs would.

2. Repellents

There is a wide variety of repellents: 1) those used on the skin, 2) candles and torches, 3) smudges, 4) granules and 5) colored bulbs.

The skin repellents are available in bottles, tubes, aerosol cans and in stick form. They vary in the time they are effective from one to five hours. Any exposed area must be covered. Although harmless, some are temporarily irritating to the mucous membranes in the eyes, nostrils and mouth. Consumer Reports (July, 1970) recommended repellents that contained diethyl toluamide, such as "Mosquitoes Lotion" and "Off" (6). Those who will not use a synthetic chemical may still use Citronella.

Candles and Torches both vaporize Citronella and are reasonably effective downwind, if used in sufficient quantity in a small area.

A smudge can be very effective if made correctly. In a metal pail or similar container place two sheets of crumpled newspaper, several small, thin pieces of dry wood and a little fresh grass. Touch a match to the paper and continue to add grass or weeds as needed. Too much grass will smother the flames completely. If "fed" properly, a smudge can last from one to two hours. Do not use a galvanized container since the galvanizing could contain cadmium, which is highly poisonous if heated.

Granules containing polymethylated naphthalenes are available, for spreading by hand or with a lawn spreader. One spreading lasts up to eight days, depending on air currents. We do not know how well it keeps mosquitoes away. We would certainly keep children from playing on the lawn where the granules are, since granules should not be allowed to come in contact with eyes or to be eaten.

3. Killing larvae with chemicals

Recommended by Cornell are larvicides Flit-MLO, Methoxychlor and Abate (4). Mosquito larvae are controlled by fish in a properly managed pond, but treatment with a larvae-killing chemical may be needed in pools or in flooded areas. Mosquito larvae are easily recognized. Start treatment only when you find larvae.

Flit-MLO is an oil which kills by clogging the breathing tubes of larvae rather than by poisoning them. This is considered harmless to fish and wildlife, but could not be located in stores in this area. "A permit is required from the Department of Environmental Conservation if any of the waters to be treated are a part of or drain into natural waters or are used for public consumption."(4). Treating large areas can result in the migration of insect-eating birds and a loss of nestlings through starvation.

If you have found that a domestic variety of mosquito emerges in a wet part of your lawn, a single spraying with methoxychlor may be useful right after the spring thaw. Methoxychlor can be used in a number of ways. It should be prepared differently for each kind of use and the instructions are on the package.

Methoxychlor has probably the largest margin of safety among insecticides, as far as any possible damage to mammals (such as people or dogs) is concerned. It is decomposed in nature and does not accumulate in food chains, so it is not likely to harm birds. On the other hand, methoxychlor kills beneficial insects, such as ladybugs and praying mantids, at least as readily as it kills mosquitoes. Large amounts of methoxychlor kill fish.

"Pyrethrum Tossits" are capsules that release a mix of oil and pyrethrum to the surface of water. Each is formulated to kill mosquito larvae in no less than 100 sq. feet of pond or pool. Higher doses of pyrethrum in water will damage fish.

4. Killing adult mosquitoes with residual poison

Residual treatment coats the preferred resting places of mosquitoes with a poison. The home owner can locate moist and shady areas, such as trunks of trees, undersides of shrubs and house foundation walls, and spray them with a simple "flit-gun" type sprayer. One spraying with a mixture of methoxychlor concentrate and water (1/6 oz. per gallon) may remain effective for as long as a few weeks, but the treatment wears off much faster if there are heavy rains or hot, sunny weather. Even though it does kill mosquitoes, the residual treatment will not bring noticeable relief from bites unless it is extended to the important resting places over a wide radius around the protected zone. A neighbor's property, however, may not legally be sprayed, unless he gives his permission.

Residual spray will, of course, kill some beneficial insects. It should never be applied in large quantities (as with a hose dispenser). If the liquid runs off onto the ground, too much is being dispensed.

5. Killing adult mosquitoes on the wing

a) Electrical insect-killing devices use a light to attract mosquitoes and other insects. They are expensive, but have some commercial uses, in places such as drive-ins or in barns.

b) Knock-down sprays are available in aerosol "bug bombs" and in concentrates which are mixed with water and used in pump-type sprayers. Such sprays serve well as a chemically magnified fly swatter: they get rid of the mosquitoes in the immediate surroundings.

Commercial sprays containing pyrethrins as the only insect-killing ingredient have been recommended (5), because pyrethrins are a natural product obtained from a plant. It is rapidly degraded in nature. This is the fastest insect killer available, but it has some drawbacks. It kills all insects indiscriminately. It is harmful to fish. Some people are allergic to it.

Methoxychlor mixed with pyrethrins is frequently used in knock-down sprays (see par. 3, above).

c) Fogs, mists and coils keep an insecticide in the air for extended periods of time. To get protection from mosquitoes one has to stay in the mist, and consequently inhale the chemical.

Mosquito coils look somewhat like a piece of rubber hose and are said to burn for four hours. They contain Aljethrin, which is similar to the pyrethrins.

Malathion is available for fogging and mist generating devices. It is a very short-lasting chemical and this adds to its safety. Malathion, however, kills a wide variety of insects and, if spraying or misting is done every few days, many kinds of small animals will be reduced or eliminated (2). Another drawback is that it affects the paint on cars. Not more than 2 lb. of malathion per acre ought to be dispensed in any one week (that is only 0.3 oz. on an area 20 x 20 feet). Fruit growers occasionally use higher concentrations, but they take special precautions to prevent damage to plants.

Malathion and methoxychlor should not be sprayed where they may settle on flowers in bloom. The sprayed flowers, such as clover and honeysuckle, become poison traps for bees.

R.C.S.I. recommends that any reader who sprays insecticides frequently or uses them over a large area take the time to obtain and read reference (3) and (5). Before heading for the woods, read reference (8).

6. Fogging large areas falls under the heading of community-wide control measures. As indicated in the introduction, it is likely to do much ecological damage with little relief from mosquitoes. True community control involves not only spraying, but management of bodies of water. Both draining and flooding of some areas may be necessary (2). Before engaging a professional service for spraying, expert advice should be sought from the New York State College of Agriculture at Albany (4), and from the Science Service of the N. Y. State Museum and Science Service (Albany, N.Y. 12224). Any plans for large-scale spraying should be made public well in advance, so that the program may be revised or curtailed on the advice of local citizens.

References

- (1) J. I. Rodale, How to Grow Vegetables and Fruits by the Organic Method, Rodale Books, Inc., Emmaus, Penna., June, 1970, pp. 325-31.
- (2) William H. Stickel, Mosquito Control Practices from a Conservation Viewpoint, Northeastern Pesticide Coordinators of the Cooperative Extension Service, Amherst, Mass., July, 1968, pp. 70, 82, 96.
- (3) B. V. Travis, Biology and Control of Biting Flies in New York State, NYS College of Agriculture, Cornell University, Ithaca, N.Y., May, 1967, pp. 18, 38. (Available from Monroe County Cooperative Extension, 249 Highland Ave., Rochester 14620.)
- (4) B. V. Travis, 1972 Recommendations to Communities for Chemical Control of Biting Flies in New York State, NYS College of Agriculture, Cornell University, Ithaca, N.Y., January, 1972, pp. 2-3. (Available from Monroe County Cooperative Extension, see above.)
- (5) B. V. Travis, 1971 Recommendations to Homeowners for Chemical Control of Biting Flies in New York State, NYS College of Agriculture, Cornell University, Ithaca, N.Y., January, 1971, pp. 3, 7. (Available from Monroe County Cooperative Extension, address above.)
- (6) Consumer Reports, Consumers Union of United States, Inc., Mount Vernon, N. Y. 10550, July, 1970.
- (7) R. Garcia, The Control of Malaria, Environment 14:2-9, June 1972.
- (8) H. Jamnback, Bloodsucking Flies and Other Nuisance Arthropods of New York State, State Museum and Science Service Memoir 19, Albany, N. Y., 1969.

End Note

Two dangerous mosquito-borne diseases, malaria and equine encephalitis, are completely under control in Monroe County even though we have the species of mosquitoes that could spread both diseases. If a mosquito-borne epidemic were to start, public health authorities would use insecticide sprays as their principal weapon against the spread of this disease. This weapon has failed in some parts of the world (7) where mosquitoes have become resistant to insecticides. Resistance develops in a species of mosquitoes when people spray insecticides routinely, killing off the normally susceptible insects and thus allowing the rare genetically resistant variants to take over. It is therefore important for public health reasons to keep to a minimum the use of insecticides for killing mosquitoes.