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Mosquito Control A Manual for Commercial Pesticide Applicators Category 7F
Michigan State University Extension Service
Joy Neumann Landis, Pesticide Education and Pest Management Assistant; Larry G. Olsen, MSU Pesticide Coordinator.
Revised February 1996
3 pages (Sample of full document)

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\$ 9.00

Mosquito Control

A Manual for Commercial Pesticide Applicators

Category 7F

Extension Bulletin E-2180
Revised February 1996
Michigan State University Extension



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1M-2:96 -TCM - SP Minor revisions, Price \$9.00 File 27.42, (Pesticide Applicator Certification).

This manual is intended to prepare pesticide applicators in mosquito control (Category 7F) for certification under Act 451, Natural Resources and Environmental Protection Act, Part 83, Pesticide Control (formerly Act 171, Michigan Pesticide Control Act of 1988). The "Pesticide Applicator Core Training Manual," E-2195, which explains safety considerations, pesticide laws, and integrated pest management principles, should also be studied to prepare for certification.

After reading each chapter of this manual, answer the review questions. Write out the answers to receive the maximum benefit from your studying. Compare your responses with the correct answers listed in the back of the manual. After completing your study of this manual and the "core" manual, take the exam administered by the Michigan Department of Agriculture to become a certified commercial pesticide applicator for mosquito control.

chites eggs are deposited singly on the water surface and float until they hatch two or three days later. The Anopheles eggs have lateral extensions that serve as floats while the Toxorhynchites eggs have projecting spines that trap air bubbles which keep them on the water surface. Culex, Culiseta, Coquillettidia, and Uranotaenia species glue individual eggs together to form a floating raft. As the eggs hatch two or three days later, the raft breaks up and individual egg cases – up to 300 or more – remain floating on the water. The eggs of Aedes, Psorophora, and Orthopodomyia species are deposited out of the water so they are adapted to withstand dryness until the area is later flooded and the eggs hatch.

.75M-1:96 -TCM - SP Minor revisions, Price \$9.00 File 27.42, (Pesticide Applicator Certification).

MOSQUITO CONTROL

A Manual For Commercial Pesticide Applicators

Category 7F

Subfamily Anophelinae – Genus Anopheles
 Subfamily Culicinae – Genus Aedes,
 Coquillettidia, Culex, Culiseta, Deinocerites, Haemogogus, Mansonia, Orthopodomyia, Psorophora, Uranotaenia, and Wyeomyia;
 Subfamily toxorhynchites – Genus Toxorhynchites (formerly Megarhinus).

In Michigan, if drainage and filling projects affect the natural environment, they are regulated by the Michigan Department of Environmental Quality (MDEQ), (formerly the Michigan Department of Natural Resources). Before attempting any draining, contact the MDEQ, Land and Water Management Division.

Figure 1. Four Life Stages and Characteristics of Anopheles and Culex Mosquitoes.

Figure 4. Diagram of Anopheline and Culicine Mosquito Heads. (Courtesy: Indiana State Board of Health)

large, open woodland pools
 EEE, VEE, CE, WEE, DHW

Coquillettidia,	Coquillettidia,	Coquillettidia,	Coquillettidia,	Coquillettidia	israelensis
Coquillettidia,	Coquillettidia	israelensis	Coquillettidia	israelensis	israelensis

Most adulticiding is performed with ultra low volume (ULV) equipment (Figure 17). These can either be purchased as hand-held units or truck-mounted units with a range of 1-4 spray heads. Since proper droplet size (12-18 microns) is very important in ULV applications those units with only 1 spray head may be easier to maintain proper droplet size than multi-head units. This type of application only kills on contact so spraying should be done shortly after sunset when adult mosquitoes are most active. Treatment should take place on the upwind side of the area to be sprayed when the wind speed is no greater than five miles per hour.

Collecting mosquitoes as they bite is one method of sampling populations. In making biting collections or counts, the subject should expose part of his (or her) body by rolling up sleeves or trouser legs, or by removing his shirt. While the subject sits quietly for a designated period of time, usually 5 to 10 minutes, collect the mosquitoes with an aspirator and place them in a collection tube for later identification.

The adult survey evaluates the incidence of mosquitoes in a community where they might bite people, and shows the relative abundance of various species present at any time. Using this information and reference material on the breeding sites and habits of mosquito species, the vector control specialists can determine the need for a control program and conduct an effective search for larval breeding places.

The oviposition trap (See Figure 26) can easily be made out of No. 10 food cans (3 lb coffee cans) painted black inside and outside. The traps are placed in shaded areas on a tree at a height no greater than 1.2 meters and filled with water with a few dried leaves placed in the bottom of the can. An oviposition substrate made of a 6"x 6" muslin strip or balsa wood is then placed inside the can with the water covering about half of it. Gravid females will then use this substrate to lay eggs just above the water level in expectation of future water levels flooding eggs and causing them to hatch.

kits at a modest price. Several publications from the World Health Organization and the American Mosquito Control Association thoroughly review resistance testing procedures and should be consulted. Also, MSU Extension personnel and professional entomologists can provide advice on carrying out such tests.

The following publications review information on insecticide evaluations and testing procedures. Consult them to answer specific questions about sampling, field procedures, etc.

Knepper, R.G. 1988. Efficacy of a ULV insecticide mixture (HAN-malathion-resmethrin) against caged *Culex* mosquitoes. *Journal of the American Mosquito Control Association* 4:561-562.

yes yes yes

TABLE 2. COMMONLY USED MOSQUITO CONTROL INSECTICIDES

Insecticides	STAGE			Oral LD50 (mg/kg)	Dermal LD50 (mg/kg)
	Larvae	Pupae	Adult		
Sumithrin (Solo)			X	>15,000	>20,000
Malathion (Fyfanon, Cythion)			X	>2,830	>2,000
Chlorpyrifos (Dursban)	X		X	96	2,000
Temephos (Abate)	X			8,600	1,300
Proprietary Petroleum (Golden Bear, Bonide)	X	X		>10,000	>3,000
Methoxychlor			X	600	2,946
Methoprene (Altosid)	X			>34,600	>3,000
Bacillus thuringensis var. israelensis (Teknar, Bactimos, Vectobac)	X			>2,000	>2,000
Resmethrin (Scourge) "Restricted Use"			X	4,240	2,500
Carbaryl (Sevin)			X	500	1,497
Pyrethrin (Pyrocide)			X	1,500	>1,800
Permethrin (Biomist, Permanone, Punt)			X	>1,500	>2,000
Bacillus sphericus*	X			n/a	n/a
Propoxur (Baygon)			X	95	>500

*At printing time of this manual, EPA registration is anticipated in late 1996 or 1997.

Compiled and edited by Joy Neumann Landis, Pesticide Education Extension Associate.
 Technical assistance by Larry G. Olsen, MSU Pesticide Coordinator.

Contributing authors: Randall Knepper, Saginaw County Mosquito Abatement Commission;
 Edward Walker, MSU Department of Entomology; Jeanne Henderson, Bay County Mosquito Control;
 H. Don Newson, MSU Department of Entomology; Charles Palmer, Michigan Department of Agriculture;
 and Sally Wagner, Saginaw County Mosquito Abatement Commission.