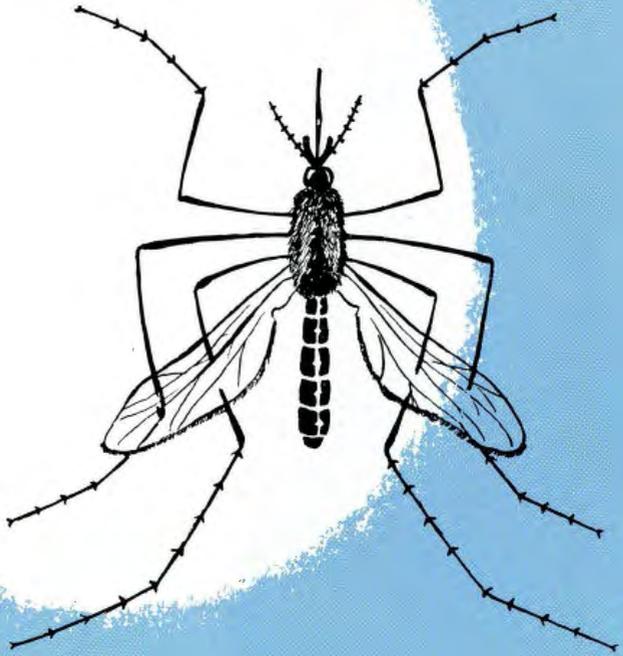


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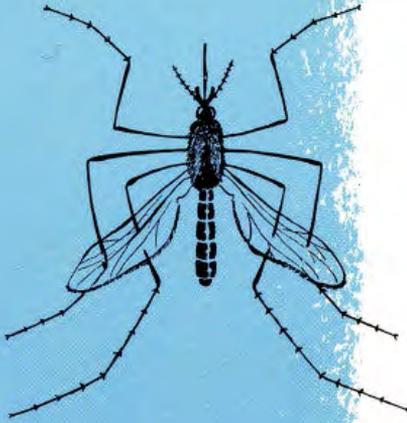
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MOSQUITO

Prevention and Control



Extension Service • Institute of Agricultural Sciences
State College of Washington • Pullman, Washington



MOSQUITO

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Prevention and Control

Mosquitoes can make our life miserable with their bites. They also attack farm animals. Beef cattle and sheep lose weight, cows give less milk, and chickens lay fewer eggs when bothered by mosquitoes. Worst of all, mosquitoes can spread dangerous diseases.

In our area encephalitis, or so-called sleeping sickness, is caused by a virus passed on by the bite of essentially one kind of mosquito, *Culex tarsalis*. One form of this disease is often fatal to horses. The only way man catches this form of sleeping sickness is by being bitten by mosquitoes.

By knowing the habits of mosquitoes and by destroying their breeding places you can do much to prevent their bites. For example, *Culex tarsalis* usually doesn't fly more than a mile or two from its breeding place. It most often bites during the evening and night. But *Aedes* mosquitoes may fly a dozen miles and some of them are vicious daytime biters.

Preventing mosquitoes from breeding is more effective than using insecticides to control them. Mosquitoes can develop resistance to repeated doses of insecticides, but they have never developed the ability to grow without water.

**Prevention
is more effective
than control**



ADULT
around for days



PUPA
tumbler in water
a few hours



EGG
on water a few hours
or on soil over winter



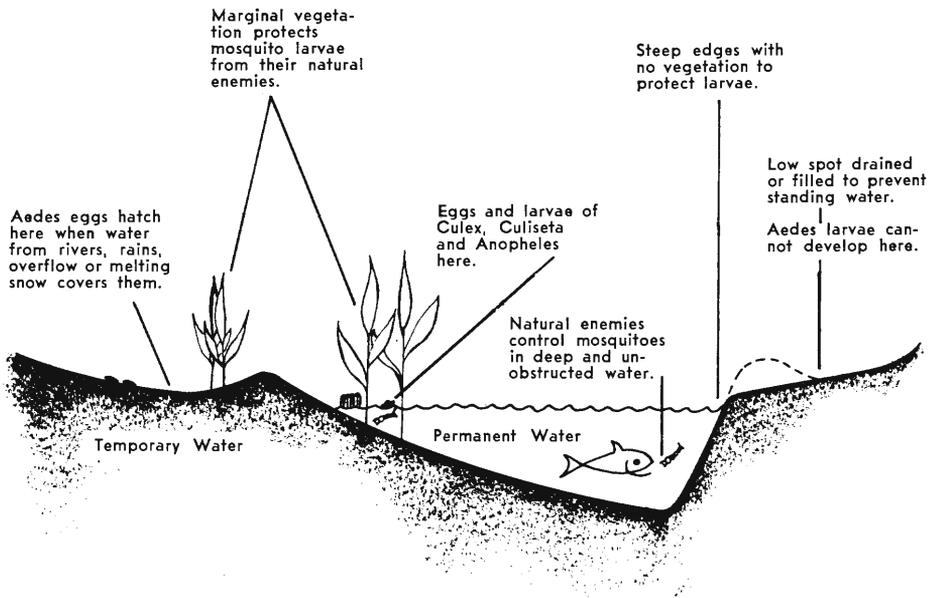
LARVA
wiggler in water
a few days

This is the cycle you can break by controlling water so the developing forms of mosquitoes don't become adults.

Mosquitoes Need Water

All mosquitoes need water in their early stages of development. Different species require different kinds of water. For example, *Aedes* mosquitoes lay eggs on ground that may be covered with water later. Other types of mosquitoes, such as *Culex*, *Culiseta* and *Anopheles*, lay their eggs only on the surface of water in ponds, streams, marshes, tin cans, rain puddles, tree holes, etc.

But, mosquitoes grow only in water. Water standing just four days may produce a crop of mosquitoes in hot weather. Adult mosquitoes may take shelter in grass, weeds and shrubbery, but they cannot breed there.



The areas on the left are good places for mosquitoes to develop. On the right, these conditions have been corrected to prevent mosquitoes.

Handle Your Water Problems This Way

- Remove standing water with drainage systems, or fill in shallow areas with earth.
- Collect extra irrigation water in a storage sump. Treat the sump with insecticides or recirculate the water to the fields.
- Check irrigation and drainage ditches for seepage. Temporary puddles from this source are the main mosquito producers in the Columbia Basin.
- Fill or drain seepage ponds and puddles. Cattle feeding around these leave water-filled hoofprints in which large numbers of *Culex tarsalis* mosquitoes develop.
- Grade newly developed land to prevent standing water.
- Control weeds in ditches. They slow water flow and allow mosquitoes to develop. Weeds also protect mosquito larvae from their natural enemies, other insects and fish. Ask your county agent about aquatic weed control.

Storage sump collects extra irrigation water to be used again. This keeps the water from standing in fields in shallow puddles.





Clogged ditch slows water.
Weeds protect mosquitoes.



Hoofprints around puddles
are good breeding places.

Waste water from
over-irrigated fields
can produce mosqui-
toes in just 4 or 5
days during hot
weather.



Temporary seepage. Flooded areas produce many mosquitoes.



Watch for These Mosquito Breeding Areas Around Your Home



For This Problem

Tin cans, old tires, gutters,
and other artificial water
containers

Sewage disposal

Ornamental pools

Bird baths

House-cooler drains

Water under homes

Tree holes

Street drains and catch
basins

Open ditches with stag-
nant or slow current

Nearby irrigated fields

Ponds, swamps

Do This

Empty, flatten or dispose of tin cans,
destroy automobile tire casings or place
where water cannot get in them. See
that rain gutters and flat roofs are drained
properly.

Keep septic tanks and drain areas in
operating condition.

Stock with fish, or treat lightly with a
pyrethrum-oil insecticide.

Change water at least twice a week.

Connect to sewer or other proper drain-
age.

Drain or treat with insecticide.

Fill with sand, or seal with mortar, or
spray with long-lasting insecticide.

Spray with insecticide. Improve drainage.

Construct enclosed drainage. Spray with
insecticide.

Fill or drain to prevent standing water.
Do not over-irrigate.

Drain or fill. Remove floating vegeta-
tion. Spray with insecticides.

INSECTICIDES

for Mosquito Control

If you can't control mosquitoes by water management, you may need to use insecticides. You can use them to control either the flying adults, or larvae in the water. But control mosquitoes at their source whenever possible.

Be careful with insecticides. Always read the directions on the container. Don't use insecticides where they may endanger children or livestock. Store them in a child-proof place. Avoid applying insecticides so freely that they might destroy valuable fish or game. In case of poisoning, call your physician or veterinarian immediately.

To apply insecticides you can use spraying equipment ranging from small aerosol bombs to large motorized pressure sprayers. Aerosol bombs spray fine droplets in the air to control flying insects indoors. The same type of control can be applied outdoors on a large scale by fogging equipment. Some fogging equipment fits the exhaust of vehicles, or even power lawnmowers. You can also coat the places where mosquitoes land. Insecticides to coat surfaces can be applied with small hand sprayers or large power sprayers.

Insecticides for Adults

Outdoors: Spray or paint insecticide on surfaces where adult mosquitoes are likely to land—under porches, around foundations, inside surfaces of farm sheds and garages, tree trunks and shrubbery. Apply until the insecticide starts to run off. This is usually about $\frac{1}{2}$ to 1 gallon of spray per 1,000 square feet of surface. Use DDT at 5 per cent actual insecticide, or chlordane at 2 per cent concentration in water. Emulsifiable sprays may burn sensitive foliage such as house plants and some evergreens. To avoid this, use wettable powders mixed with water at the same rates. These sprays may leave a powdery deposit.

Indoors: Household sprays or aerosol bombs are effective. Handle the spray so that it will not contaminate food. Before you install your window screens for the summer, paint both sides of the screen with 5 per cent DDT in deodorized kerosene. You may have to treat them again during the summer.

Insecticides for Larvae

Ornamental pools: To avoid killing fish, use not more than 1 fluid ounce of a 1/10 of 1 per cent pyrethrum insecticide per 100 square feet of water surface.

Swampy areas, open ditches, irrigated fields, tree holes: Use emulsifiable preparations of DDT at 1/2 to 1 pound actual insecticide per acre, or use malathion at 1/4 to 1/2 pound actual insecticide per acre. Mix with diesel oil, which is most effective but may be injurious to plants, or with water. Use about 3 gallons of spray per acre.

Personal Protection

In areas thick with mosquitoes, you can use repellents to protect yourself from bites. Several good repellents are available. The most effective kind contains diethyl toluamide and prevents bites for several hours to a day. Repellents should be thoroughly rubbed into the skin. They do not harm most fabrics, but keep them away from rayon and Dynel. Follow the manufacturer's advice in using repellents. Most preparations will irritate the eyes or lips.

Mixing Insecticide Sprays

You can use several different concentrations of insecticides to make up the sprays in the strength you want. *Read the label* on the insecticide container so you will know what concentration it is.

Emulsifiable insecticides are liquids with a given percentage, such as 10 per cent or 25 per cent. The label usually also lists the number of pounds, such as 1 pound or 4 pounds, of actual insecticide per gallon. The pounds of insecticide per gallon tell you the dilution necessary to make a finished spray. Emulsifiable formulations can be mixed with water, with kerosene, or with diesel oil as required.

Wettable powders are to be mixed with water only. They must be kept mixed by agitation during spraying. The label gives the percentage of actual insecticide on a weight basis. For example 1 pound of 50 per cent wettable powder contains 1/2 pound of actual insecticide.

Spray Concentration Tables

Here are tables to help you use any concentration of insecticide at the correct dosage for mosquito control.

For example, you want to treat one acre of swampy land to control larvae. You have decided to use DDT at the 1/2 pound per acre rate. The insecticide you purchased was 25 per cent emulsifiable (2 pounds of actual insecticide per gallon). So, you look at the chart for larval control—in the column for the 1/2 pound per acre rate. The amount shown for 25 per cent emulsifiable concentration is 1 quart. This means you use 1 quart of your insecticide to mix with 3 gallons of liquid to make the spray.

LARVAL CONTROL

Amount of Insecticide Needed for Recommended Concentration of Spray

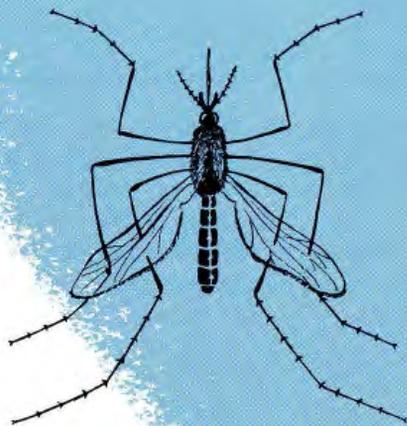
CONCENTRATION ON CONTAINER LABEL	To treat an acre with the rates of insecticide listed below, add the indicated amount to 3 gallons of water, kerosene, or diesel oil.			To treat 1,000 square feet with the rates of insecticide listed below, add the indicated amount to 1 1/8 cups of liquid.		
	1/4 lb/acre	1/2 lb/acre	1 lb/acre	1/4 lb/acre	1/2 lb/acre	1 lb/acre
10-12% emulsifiable (1 lb. insecticide/gal.)	1 quart	2 quarts	1 gallon	1 1/2 TBS.	3 TBS.	6 TBS.
25% emulsifiable (2 lb. insecticide/gal.)	1 pint	1 quart	2 quarts	2 tsp.	1 1/2 TBS.	3 TBS.
40-50% emulsifiable (4 lb. insecticide/gal.)	1/2 pint	1 pint	1 quart	1 tsp.	2 tsp.	1 1/2 TBS.

ADULT MOSQUITO CONTROL

Amount of Insecticide Needed for Recommended Percentage of Spray

CONCENTRATION ON CONTAINER LABEL	Per 10 gallons of total liquid to give:		Per 1 gallon of total liquid to give:	
	2 per cent	5 per cent	2 per cent	5 per cent
10-12% emulsifiable (1 lb. insecticide/gal.)	6 1/2 quarts	4 gallons	2 2/3 cups	6 1/2 cups
25% emulsifiable (2 lb. insecticide/gal.)	6 1/2 pints	2 gallons	1 1/3 cups	3 1/4 cups
40-50% emulsifiable (4 lb. insecticide/gal.)	6 1/2 cups	1 gallon	2/3 cup	1 1/2 cups
25% wettable powder	6.4 pounds	16 pounds	.6 pound	1.6 pounds
50% wettable powder	3.2 pounds	8 pounds	.3 pound	.8 pound
75% wettable powder	2 pounds	5.3 pounds	.2 pound	.5 pound

MOSQUITO PREVENTION AND CONTROL



- Through careless handling of water, you may be creating your own mosquito problems.
- Without control, one female mosquito and its offspring can multiply to several million in one summer!
- It's more effective to prevent mosquitoes from breeding than to try to control them afterwards with insecticides.
- Cooperate with groups developing community or area mosquito control programs.
- Contact your County Extension Agent or County Health Unit for further information on mosquito control problems.
- Read directions and follow recommendations carefully when using insecticides.
- And, remember, the mosquito you swat may be your own.