

## Least-toxic Control of Mosquitoes

Mosquitoes are dependant on suitable aquatic breeding habitats to complete their life cycle. Eggs must be laid on the surface of slow-moving or standing water, where they hatch a few days later into larvae. Larvae live and feed underwater, while breathing air from the surface. After four developmental stages, larvae enter the pupal stage, in which it does not feed and remains at the surface until eventually emerging as an adult. Complete life cycles can be as short as a week.

Sensible control strategies involve reducing breeding sites, which provides long-term control over mosquito populations, and controlling mosquito populations during aquatic stages, before they mature and have a chance to reproduce, transfer disease, and annoy. Larvaciding allows control measures to be conducted over the smallest possible area when mosquitoes are concentrated in breeding pools, before adults spread throughout the community.

Adulticiding programs do not get at the mosquitoes until they have matured and are already a nuisance, and do little to restrict breeding. Mosquitoes develop resistance to chemical pesticides over time, which render the chemicals ineffective. Adulticides also present considerable risk to all living things, and kill beneficial insects and natural mosquito predators, such as dragonflies, damselflies, and beetles.

### **Prevention**

- Remain indoors in the evenings, when most mosquito activity occurs.
- Maintain window screens and doors, closing all opened doors and use screened-in porches instead of open porches.
- Remove or drain all tin cans, pet dishes, buckets, holes in trees, clogged gutters and down spouts, old tires, birdbaths, shallow fishless ponds, and other water-retaining objects.
- Stock permanent water pools, such as ornamental ponds, with mosquito larvae eating fish.
- Check for standing water in plastic or canvas tarps used to cover pools and boats. Arrange tarps to drain water and turn canoes and small boats upside down for storage.
- Fix dripping outside water faucets.

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- Use herbal repellants to ward off mosquitoes, such as Skin-so-soft, Herbal Armour, and cedarwood. Reapply often.

### **Monitoring**

Check ponds and sources of water for signs of mosquito larvae.

### **Control**

- Burn **citronella candles** and torches to control mosquitoes in the immediate vicinity when there is no wind.
- Stock ornamental ponds with **mosquito larvae-eating fish**, such as mosquito fish of the *Gambusia* genus. This fish should be stocked in enclosed water so they will remain in the area in need of control. Only indigenous species should be used.
- ***Bacillus thuringiensis var. israelensis*** is one of the most popular and most effective least-toxic biological controls. It is a bacterial strain that, when sprayed into larval pools, is ingested by feeding larvae and kills them.
- **Horticultural oils** (vegetable based) are effective in killing larvae in water and sinking egg rafts on the surface. They also can kill non-target organisms including some mosquito predators that breathe from the surface.

Contact Beyond Pesticides for examples of successful community IPM programs for mosquito control.

### **References**

Beyond Pesticides/NCAMP. "Least Toxic Control of Pests In the Home & Garden: A series of pest control & chemical factsheets." Washington, DC.

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Quarles, William. 1996. "Botanical Mosquito Repellents." *Common Sense Pest Control*: 12(4): 12-19. Berkeley, CA.

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