How to Battle Mosquitoes and Win

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In a few weeks, warmer weather will usher in mosquito season. Let's look at some general facts about these tiny vampires (webpages on individual species are linked at the end).

These insects undergo a complete metamorphosis: egg, larva, pupa, and adult. The eggs must hatch in water; the larva and pupa need to remain in water throughout these life stages. Depending on the species and temperatures, development may take a week or so. Most larvae eat algae and decomposing matter while other species consume other young mosquitoes! The exact amount of stagnant water needed for development depends on the species; the notoriously aggressive and invasive tiger mosquito (*Aedes albopictus*, formerly *Stegomyia albopicta*), can develop in a mere thimbleful of water. Weak-flying adults prefer hovering close to the ground. As a result, dragonflies, spiders, and other predatory invertebrates serve as better biological mosquito controls than local birds and bats. Mosquitoes favor staying within their breeding grounds and avoid flights in wind. Both males and females drink nectar for sustenance, but females require blood meals for egg development. Females inject an anticoagulant with their bite which causes an itchy immune response. Females may venture away from their birthplace if blood meals are scarce. They detect body heat, odors emitted (they love perfumes), and carbon dioxide exhaled from their prey from a maximum of about 75-100 feet away. Depending on the species in question, certain mosquitoes act as transmitters or "vectors" for specific pathogens.

People frequently ask, "What can I do to keep mosquitoes away?" The answer is easy: stop inviting them! Folks commonly associate mosquitoes with deep woods, but the truth is that park volunteers rarely encounter mosquitoes in forests. These insects may occur around slow-moving streams, where fish and other predators keep larvae and adults in check. However, volunteers frequently come across mosquitoes near property lines. Humans create many wonderful places to trap water for spawning mosquitoes, such as:

- Junk (bottles, lids, jars, beer cans, old toys, tires, even crumpled plastic bags and tarps)
- Flower pots, birdbaths, open trashcans, and other containers lacking routine cleaning
- Ornamental ponds, fountains, or aquatic plant pots that are infrequently cleaned, lack fish, or mosquito controls (e.g., mosquito dunks containing the larvicidal bacteria, *Bacillus thuringiensis*)
- Boats, wheelbarrows, shovels, and other exposed, upward-facing tools capable of water collection
- Corrugated drain pipes, misaligned water diverters, and clogged gutters
- Handles, crates, or any other plastics with perpendicular reinforcements

Eliminate the stagnant water breeding areas, eliminate most of the mosquitoes—simple as that! A properly constructed rain garden will not turn into a mosquito oasis since the ground absorbs all water within a day or two of the passing storm. Likewise, mesh coverings prevent rain barrels from becoming breeding pools. Fairfax County may use dunks in storm drains. Mosquito sampling stations, like the one sometimes appearing in Crooked Creek Park, help officials locally gauge this pest's population and act accordingly.

People sensitive to or otherwise averse to insect repellents such as DEET should wear physical barriers (e.g., long-sleeved shirts and pants) for personal protection. Wide-brimmed hats help keep biting insects, including gnats, away from the face since they avoid flying under such edges. **Do not use or hire contractors to apply pesticide yard sprays including those containing organophosphates (e.g., malathion), pyrethrins, and/or pyrethroids!** The most common impacts to humans from acute pyrethrin exposure may include neurotoxicity and some immune system effects including heightened allergies. Sometimes, the proprietary "inactive ingredients," which include surfactants and emulsifiers, have greater toxicity than the active chemical. In the environment, broad spectrum pyrethrins and organophosphates indiscriminately kill valuable pollinating insects and the beneficial predatory invertebrates naturally controlling mosquito populations. Rains soon wash the chemical residues into waterways where aquatic life is especially prone to insecticide toxicity. Since mist treatments require frequent reapplications and an unnecessary expense, skip those Sisyphean sprays. Remember that the best way to get rid of

mosquitoes is by denying them a breeding ground: clean up the yard, repair gutters, remove any other stagnant water sources, and toss the trash littering public places into garbage cans. Furthermore, ask your neighbors to do the same.

For general mosquito facts, check out these resources:

http://www.mosquito.org/
https://www.fairfaxcounty.gov/health/fightthebite/mosquito-diseases
http://www2.epa.gov/mosquitocontrol

For information about Virginia's mosquito species:

http://www.mosquito-va.org/vamosquitoes.htm

Get the facts on…

…pyrethrins and pyrethroids:

http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC34291
http://www.atsdr.cdc.gov/toxprofiles/tp155.pdf
http://www.inchem.org/documents/pims/chemical/pimg026.htm

…organophosphates including malathion:

http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC32924
http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0003353/
http://npic.orst.edu/factsheets/malatech.html

Figure 1. Backyard objects trapping rain provide perfect suburban mosquito breeding grounds. Examples include: A) flower pots, garden tools, and outdoor supplies; B) exposed tires; C) bottles, caps, and cans; D) toys such as this inverted Frisbee; E) crumpled plastic bags and tarps; and F) corrugated drains*.

***Frequent rains adequately flush out mosquito eggs through corrugated drains. These drains harbor larvae when drier periods trap water during mosquitoes' early lifecycle. Combat this problem by briefly disconnecting and emptying the pipes after storms, installing perforated lines, or replacing with smooth pipes.**

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