

MOSQUITO SPRAYING KILLS POLLINATORS

HABITAT PROTECTION AND OTHER SIMPLE MEASURES ARE FAR MORE EFFECTIVE

BY NANCY LAWSON

The colorful fliers from pest control and lawn care companies pile up each spring, promising good times and protection against evil forces: “Outside is fun again.” “The only good mosquito is a dead one.”

And this blatantly misleading statement, cloaked in a design as tantalizing as a candy wrapper: “Kids love butterflies, not ticks and mosquitoes. Battle back to protect your family and pets.”

The mirage comes complete with collaged stock images of toddlers admiring a blue butterfly from the tropics, a visual distortion belying a deadly myth: that mosquito sprays are safe for all but their intended targets.

Despite claims about species-specific sprays, applicators typically wield pyrethroids, broad-spectrum insecticides applied at levels that kill not only mosquitoes but also bees and butterfly caterpillars, according to a soon-to-be-published study by the Xerces Society for Invertebrate Conservation. In some cases, contamination levels of sprayed yards were higher than known thresholds for killing honeybees, says Xerces pesticide program specialist Aaron Anderson.

Common assertions that typical yard treatments affect only mosquitoes are also untrue. Fireflies and many other insects roost, nest, and eat on vegetation targeted by applicators. Because some formulations are long-lasting, they may continue to harm insects that come into contact with the products for days or weeks. Anderson cites the example of leafcutter bees lining nests with leaf pieces before laying eggs and adding pollen: “If that leaf was sprayed with a pyrethroid ... that means the adult bee is being exposed, but then also potentially the egg and the larva as it’s developing.” Pollen and nectar might be contaminated, too.

PREDATOR PROTECTION

Mosquito spraying propaganda follows a well-worn playbook of false product marketing: 1) name a target; 2) spread myths about that target; 3) invoke guilt by association about other misunderstood targets (usually ants and spiders); and 4) promise a paradisiacal existence once all targets are eliminated.

Such linear tropes, ecologists say, reveal basic misunderstandings of mosquito ecology. We’re most familiar with the disease-carrying species such as ones in the genus *Culex* but there are over 100 genera of the insect. Most of the world’s 3,500 mosquito species don’t even bite people, and many play important roles as pollinators as well as prey. Of the 200 species present in the U.S. and outlying territories, 12 carry disease-causing pathogens. Targeting all adult mosquitoes can encourage those few disease-vector species to proliferate and develop greater resistance. But when multiple species are competing for food, egg-laying sites, and hosts, “a healthy, diverse, thriving mosquito community is actually a defense against any one species—like West Nile virus-vectoring mosquitoes—becoming overly abundant,” says Adrian Carper, a senior ecologist for the city of Boulder, Colorado’s Climate Initiatives Department, which operates one of the nation’s most innovative mosquito management programs.

It can take a million droplets of insecticide just to reach one adult mosquito. All that spray destroys nature’s defenses, killing mosquito predators along with their prey. Carper’s team avoids targeting adult mosquitoes altogether and focuses only on true threats to public health, selectively treating larvae of the region’s two primary disease-vector *Culex* species. Team members use small amounts of BTi (*Bacillus thuringiensis israelensis*), a naturally occurring bacteria that, while much safer and more targeted than other pesticides,



can still harm larvae of other flies, damselflies, dragonflies, and amphibians. In a 20-acre marshland, the team might apply less than a teaspoon of BTi granules, adding it only to spots with high numbers of *Culex* larvae. The approach requires careful monitoring, says Carper, but “we think that spraying pesticides for mosquitoes doesn’t outweigh the risks that they pose for both human health and the environment.”

The results are astounding: Each year, the incidence of infected mosquitoes, as well as the overall mosquito population, remains below the threshold of concern for disease risk even while surrounding communities that spray adulticides experience record levels. In the field, Boulder’s ecologists see visceral evidence of functioning ecosystems at work, walking among clouds of mosquito-eating dragonflies and spotting aquatic beetles munching on mosquito larvae in their water samples.

EFFECTIVE ALTERNATIVES TO PESTICIDES

Public health is a priority for all mosquito management programs, but most spraying programs and services present more risks than they resolve. Studies have linked human pyrethroid exposure to potential cognitive problems, reproductive issues, and increased risk of death from cardiovascular disease.

Just as importantly, adulticides don’t address real sources of mosquito abundance: stagnant water. Mosquitoes can breed in a few drops of water held in a bottle cap, taking about eight days to develop. Dumping standing water from containers, cleaning gutters, and rinsing bird baths reduces breeding sites. Ponds with rich habitat might support enough predator–prey balance, but if needed, a pump with a screen can keep water moving while also protecting tadpoles and aquatic invertebrates. Repellents and long sleeves offer personal protection, and the turbulent air of a box fan deters mosquitoes from sunset dinners.

Though the Xerces study found lower pesticide levels in neighboring yards than in the sprayed yards themselves, “there was still a potential for harm” through drift, says Anderson. Persuading neighbors to stop is the best option, he notes, but planting a drift barrier that’s nonflowering and therefore less likely to attract pollinators—such as an arborvitae hedge—can also help.

As with so many other environmental issues, biodiversity is key to mitigating risk. As nutrient cyclers and pollinators, mosquitoes contribute to that biodiversity; one U.S. species, the snow pool mosquito (*Aedes communis*) moves around pollen while nectaring on blunt-leaf orchids. As prey, mosquitoes support a vast food web; dragonflies eat them at all life stages, and birds eat dragonflies, mosquitoes, and countless other insects vulnerable to spraying. “Most people think about mosquitoes as, ‘I’m annoyed by them; kill them at all costs,’” says Carper. “But if you want a thriving bird community, you need them as an integral part of the ecosystem.” Yes, outside can be fun again—and full of butterflies and birdsong—if we stop poisoning the homes of our wild neighbors. //

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What About Those Buckets?

A popular method of residential mosquito control involves filling a bucket halfway with water and adding handfuls of straw or grass; the resulting odor lures female mosquitoes to lay eggs. By frequently dumping the contents, a homeowner can prevent developing larvae from completing their life cycle and, in theory, reduce the breeding of local mosquito populations.

Many people add commercially available mosquito dunks made of BTi (*Bacillus thuringiensis israelensis*) to these DIY traps as well as to birdbaths. BTi works by releasing toxins into the guts of mosquito larvae. But it can also harm larvae of crane flies, shore flies, gnats, damselflies, dragonflies, and frogs, and its effects on soil biota are unknown.

The best course of action may be the simplest: Dumping buckets and other standing water every few days is just as effective, notes Xerces Society pesticide program specialist Aaron Anderson, and reduces the chances of unintended consequences.