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What You Need to Know Before Spraying for Mosquitoes

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When the weather is nice, there's nothing better than getting out of the house to enjoy nature right outside your door. Whether it's grilling out with family, doing some gardening, or even just taking a nap in the fresh air, spending time in your yard or on your deck or patio is a great way to connect with nature. Good friends and family and backyard birds and butterflies are always welcome, but there's one guest nobody wants visiting while enjoying time outside: mosquitoes. These pesky insects can turn a pleasant outdoor gathering into an itchy nightmare. No one likes mosquito bites, so it's understandable that you may be considering hiring a mosquito-control company to treat your yard by spraying it with insecticide. Maybe you already have.

Unfortunately, despite marketing claims, these sprays don't just harm mosquitoes. The most widely used residential mosquito sprays are also highly toxic to native pollinators such as bees and butterflies, fish and other aquatic organisms, and they can even pose a risk to pets and people. Here's what you need to know before spraying.

What's in Mosquito Sprays?

Most residential mosquito control companies use insecticides known as pyrethrins, which are chemicals derived from chrysanthemum flowers that are toxic to insects; or more frequently, pyrethroids, which are synthetic chemicals that mimic pyrethrins. Whether natural or synthetic, these are broad-spectrum insecticides that are highly toxic to a wide variety of insects, not just mosquitoes.

Mosquito sprays will kill any insect, not just mosquitoes. Photo: Dawn Marie Staccia

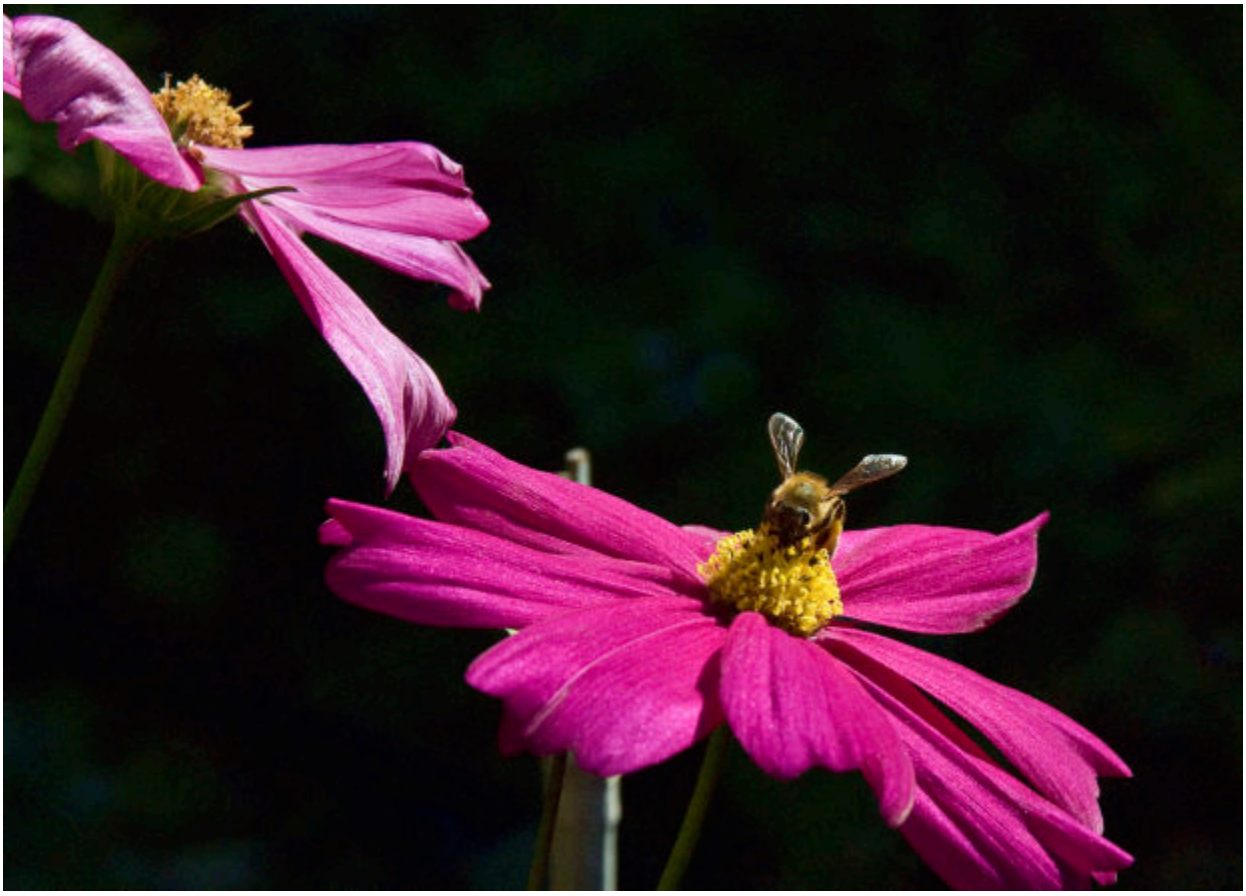
Companies such as Mosquito Joe, Mosquito Squad, Mosquito Authority and a host of others use pyrethrins and pyrethroids in their standard treatment options. Marketing efforts and corporate talking points correctly state that these pesticides are regulated and approved for use by the Environmental Protection Agency (EPA), but that doesn't mean they are without any negative environmental consequences.

We know the specific pyrethroids that these companies use such as bifenthrin, deltamethrin, and permethrin are all highly toxic to bees, killing them on contact and for one or more days after treatment, a fact the EPA itself acknowledges.

There is no way for companies to spray these broad-spectrum insecticides in your yard without also killing other insects they come in contact with, including bees, butterflies, caterpillars, ladybugs, dragonflies and other beneficial insects, along with the mosquitoes.

How Sprays Hurt Bees and Other Wildlife

The focus of much of the toxicity testing by regulatory agencies has been on domesticated honey bees because their pollination services are critically important for our agriculture system and food production. Researchers have documented widespread contamination of honey bee hives with toxic pyrethroids, finding residues of these chemicals in the pollen that bees bring back to the hive, in beeswax, and on bees themselves, at levels that can be lethal to bees or cause harmful effects.



Mosquito-control insecticides have been linked with declines in domesticated honey bees as well as native pollinators. Photo: Michael Medefind

Even extremely small, residual doses of the chemicals used in mosquito sprays can disorient honey bees and prevent them from returning to the hive. One study found that after topical application of only *0.009 micrograms* of permethrin per bee, none of the observed bees returned to the hive at days end because of disorientation due to the treatment. A separate study with different authors found similar effects for deltamethrin, which disoriented 91% of return bee flights to the hive after a dose of only *.0025 micrograms* per bee. With declining bee populations worldwide threatening global food security and nutrition, we can't afford to continue killing or harming bees.

Much less is known about the impacts of these sprays on wild insects and other native wildlife, but mosquito-control insecticides have been linked with declines of native pollinators. It's clear that wild native bees and other pollinators are also at risk from mosquito pesticides. Wild bee susceptibility to insecticides directly correlates with the surface area to volume ratio of the bee, meaning smaller bees like alfalfa-pollinating alkali bees native to the west and southwestern U.S. are at even greater risk from mosquito sprays than honey bees.

Thousands of migrating monarchs were recently killed after aerial spraying of pesticides targeted at mosquitoes. Photo: Mat Paulson.

Recently, thousands of monarch butterflies were found dead in the Fargo-Moorhead area of North Dakota and Minnesota after aerial spraying of a 100-square mile area with permethrin to control mosquitoes. Monarch populations have plummeted at an alarming rate in recent decades. The total ecological impact of a spraying event like this is untold, but surely devastating to an unimaginable number of wild insects due to permethrin's broad-spectrum toxicity.

Many insects are beneficial to humans, serving as pollinators and pest predators. Many are beautiful and iconic, like the monarch butterfly. Insects are also part of the base of the food web, without which other wildlife cannot survive.

For example, 96 percent of our backyard birds rely on insects as the exclusive food source for their babies. When you spray your yard for mosquitoes, you also kill off that food source and make it more difficult for birds to successfully reproduce. Almost 30 percent of the North American bird population has disappeared in just the last 50 years. Insect populations themselves are rapidly plummeting as well. Pesticides are a factor in all of these wildlife declines.

Mosquitoes themselves play an ecological role, serving as pollinators and as a food source for other wildlife.

Other Impacts of Mosquito Sprays

Mosquito sprays aren't just toxic to insects, either. Runoff can wash these chemicals from our yards into surface waters, where they can poison aquatic organisms such as fish and crustaceans, which are highly sensitive to pyrethroids. Pets exposed to pyrethroids can experience vomiting, diarrhea, lethargy, and other symptoms.

Runoff can wash pesticides from our yards into your local streams.

While the risk to humans from pyrethroids is relatively low when applied properly, these products are far from harmless to human health. People exposed to large amounts of pyrethroids can experience effects like stinging skin, dizziness, headache, or nausea that might last for several hours. Pyrethroids can enter your body if you breathe air containing the chemicals, eat food that has been contaminated by the spray, or if your skin comes into contact with the spray. Children and infants are the most vulnerable risk group to pyrethroids.

Alternatives to Spraying

Luckily, it's possible to keep mosquitoes at bay and reduce your chances of being bitten even without pesticide sprays. We encourage you to avoid broad-spectrum insecticide sprays because of their deadly impacts on non-target insects and other wildlife, and instead consider more effective and less harmful mosquito control strategies.

Many companies offer "organic" spray options marketed as less dangerous. Such sprays are typically made up of various plant-based essential oils, but that doesn't mean they are effective or without negative impacts. These oils can still be harmful to bees and other beneficial insects upon direct contact, so they shouldn't be used on flowering plants or during the day when bees are active. More research is needed to fully understand the impacts of these alternative sprays on native insects and other organisms.

Eliminating mosquito breeding areas, such as clogged gutters that hold water, is the most effective way to reduce mosquitoes in your yard. Photo: David Mizejewski

Overall, the most effective and safest ways to control mosquitoes in your yard are through source reduction and early intervention. Mosquito larvae need stagnant water to develop, so try to regularly remove or drain sources of standing water which can pool up in gutters, corrugated PVC drainage pipes, kids' playsets or any debris left outside. For sources of water you can't drain, use mosquito dunks or other products containing the bacterium *Bacillus thuringiensis* or "Bt," which targets mosquito larvae and other biting flies but is essentially harmless to other wildlife and people. Other wildlife like turtles, copepods, frogs, dragonflies and birds are voracious predators of mosquitoes, so enlist their help by gardening for wildlife and doing your part to maintain healthy populations of these wild allies.

If mosquitoes are still a problem for you, you can protect yourself from bites by wearing long sleeves when mosquitoes are present or using repellents containing DEET or oil of lemon eucalyptus, a botanical spray that has been shown to be as effective as synthetic repellents. Even a simple electric fan can help significantly by blowing away your scent and making it harder for mosquitoes to find you.

Mosquitoes are annoying, but we don't need to sacrifice native wildlife and put our own health at risk to keep them away. As you head outdoors, ditch the toxic mosquito spray services, and take advantage of the more natural and effective ways to reduce mosquito bites. You'll get to enjoy a painless outdoor celebration, and the bees will thank you.