

# THE AUDUBON GUIDE TO HOME PESTICIDES

Before you don work gloves and take up the perennial battle against pests and weeds, consider this: Pesticides used by homeowners can wreak havoc on wildlife, even when they're correctly applied. About a dozen pesticides approved for backyard use have caused documented die-offs of birds. If mishandled, these chemicals can also be toxic to humans, especially children, who might accidentally swallow them. Below is a list of some of the active ingredients found in the most popular off-the-shelf pesticides. Keep in mind that formulations vary—even within one product and one brand—so be sure to read the labels carefully each time you shop. (Two popular herbicides, 2,4-D and glyphosate, are included, though their toxicity to birds and wildlife is considered low.) On the flip side of this chart, some tips on reducing pesticide use. **BY JOEL BOURNE**

CHEMICAL	USES	HOW IT WORKS	TOXICITY TO HUMANS AND WILDLIFE	EPA RATING	ALTERNATIVES
 <b>ACEPHATE</b> (An organophosphate insecticide used in Orthene and other products.)	Acephate is used to kill aphids and other biting and sucking insects as well as leafminers, caterpillars, sawflies, and thrips. Commonly a foliar spray (also available in granules), it's used on ornamentals, especially roses and chrysanthemums.	The first organophosphate and carbamate pesticides were developed in the 1940s. They kill insects by inhibiting cholinesterase enzymes that are vital for transmitting nerve impulses; this can lead to respiratory failure and death. A wide variety of species are vulnerable to these substances, but birds are particularly sensitive (more than 100 bird species have been poisoned by these insecticides), and waterfowl, passerines, and raptors have been hit hardest. Birds are exposed through inhalation, absorption through the skin, or by eating treated seeds or berries, vegetation, pesticide granules, or poisoned insects. Poisoned birds often exhibit signs of nervous-system overload, including paralysis, excessive mucus secretion, diarrhea, and respiratory distress. Cholinesterase-inhibiting pesticides have been linked to nervous-system disorders in humans. Young children are particularly vulnerable to exposure to organophosphate and carbamate pesticides. In humans, overexposure can cause rapid heartbeat, dizziness, blurred vision, nausea, abdominal cramps, wheezing, chest tightness, throat spasms, and, in severe cases, death by respiratory failure or cardiac arrest.	Acephate is highly toxic to most insects (including beneficial ones such as bees) and is moderately toxic to humans and wildlife. Even so, the EPA labels acephate with its mildest signal word: CAUTION. Residues can last more than two weeks on vegetables and fruits.		For aphids, use ladybugs and lacewings, both of which are readily available by mail order. You can also hose down infected plants with water. Try insecticidal soaps, superior oils, summer oil, or synthetic pyrethrum for aphids, leafminers, sawflies, and thrips. The bacterium <i>Bacillus thuringiensis</i> , or Bt, is effective on caterpillars but also kills beneficial moths and butterflies, so be careful how you apply it.
 <b>BENDIOCARB</b> (A carbamate insecticide used in Ficom and other products.)	Bendiocarb is used on lawns and gardens to kill a variety of nuisance and disease-carrying insects, including mosquitoes, flies, ants, wasps, fleas, cockroaches, silverfish, and ticks, as well as snails, slugs, and soil insects. Available in granules, sprays, and powders.	Bendiocarb, like most carbamates, is fairly toxic to humans, and it is very toxic to birds and fish. Mallards, wrens, and blackbirds have been killed from home use of this chemical. It lasts for one to four weeks in the soil and is deadly to bees and earthworms, so if you like to see robins in your yard, use something else.	Bendiocarb, like most carbamates, is fairly toxic to humans, and it is very toxic to birds and fish. Mallards, wrens, and blackbirds have been killed from home use of this chemical. It lasts for one to four weeks in the soil and is deadly to bees and earthworms, so if you like to see robins in your yard, use something else.	 	Try pyrethrum for flying insects, boric acid indoors for fleas (it should not be used on pets) and cockroaches, and baits for cockroaches. Trap slugs and snails in pie plates buried to ground level and filled with beer. Another alternative is to use parasitic nematodes for fleas.
 <b>CHLORPYRIFOS</b> (Organophosphate used in Dursban, Dragon, Ortho-Klor, and other products.)	Widely used as a perimeter treatment and sprayed near buildings, chlorpyrifos kills ants, armyworms, ticks, chinch bugs, mites, roaches, crickets, cutworms, earwigs, fleas, grasshoppers, millipedes, sowbugs, turf weevils, mole crickets, and white grubs.	Chlorpyrifos, which can be absorbed through the skin, is slightly to moderately toxic to humans and may cause eye and skin irritation. Keep children and pets off treated areas until the material is washed into the soil and the grass is dry. It is toxic to fish, shrimp, crabs, birds, and other wildlife and has been implicated in numerous wildlife poisonings, including those of robins, pigeons, and Canada geese.	Chlorpyrifos, which can be absorbed through the skin, is slightly to moderately toxic to humans and may cause eye and skin irritation. Keep children and pets off treated areas until the material is washed into the soil and the grass is dry. It is toxic to fish, shrimp, crabs, birds, and other wildlife and has been implicated in numerous wildlife poisonings, including those of robins, pigeons, and Canada geese.	 	For termites: diflubenzuron (Siren Termite Bait), hexaflumeron (Sentricom); for spider mites: bifentazate (Floramite); for caterpillars: a Bt biopesticide; for aphids, whiteflies, mealybugs: insecticidal soaps. Also try ladybugs for aphids, insecticidal soaps and superior oil for whiteflies, milky spore disease for Japanese beetle grubs, and <i>Beauveria bassiana</i> fungus for chinch bugs. Nematodes can be effective on a variety of grubs, beetles, grasshoppers, and other insects. Imidacloprid (Merit) and halfenozide (Grub-B-Gon) can also be used for grubs.
 <b>DAZINON</b> (Organophosphate used in Bonide Diazinon Soil Granules, Knox-Out, and other products.)	Homeowners use diazinon to control aphids, bagworms, carpenter ants, lacebugs, scale, whiteflies, fire ants, grubs, cockroaches, fleas, termites, and many other insects around the home, lawn, and garden. It's commonly sold as light-brown granules.	Diazinon can be harmful to humans if swallowed, inhaled, or if it contacts the skin, and is highly toxic to birds, fish, and other wildlife. Diazinon applied to a golf course on Long Island, New York, in the early 1980s killed 700 brant geese, 28 percent of the local wintering population. Similar events led the EPA to ban its use on golf courses and turf farms, but homeowners can still buy it. Nearly half of all reported wildlife poisonings from home or garden pesticide use involve diazinon.	Diazinon can be harmful to humans if swallowed, inhaled, or if it contacts the skin, and is highly toxic to birds, fish, and other wildlife. Diazinon applied to a golf course on Long Island, New York, in the early 1980s killed 700 brant geese, 28 percent of the local wintering population. Similar events led the EPA to ban its use on golf courses and turf farms, but homeowners can still buy it. Nearly half of all reported wildlife poisonings from home or garden pesticide use involve diazinon.		Try the same alternatives as for chlorpyrifos, above.
 <b>DIMETHOATE</b> (Organophosphate used in Cygon and a variety of other products.)	Dimethoate kills caterpillars, mites, aphids, thrips, plant hoppers, and whiteflies. It is absorbed by ornamentals, fruits, and vegetables for residual protection from these insects for days to weeks. It's available as a spray, dust, and emulsifiable concentrate.	Dimethoate is toxic to humans if swallowed, inhaled, or absorbed through the skin. It has caused severe eye irritation in workers manufacturing the product. People with respiratory problems should avoid exposure to this chemical. Dimethoate is highly toxic to birds, honeybees, and aquatic insects, and moderately toxic to fish.	Dimethoate is toxic to humans if swallowed, inhaled, or absorbed through the skin. It has caused severe eye irritation in workers manufacturing the product. People with respiratory problems should avoid exposure to this chemical. Dimethoate is highly toxic to birds, honeybees, and aquatic insects, and moderately toxic to fish.		Try superior oils or summer oil for mites, aphids, thrips, and, to a lesser extent, whiteflies. Selectively use Bt biopesticides on caterpillars. Rotenone and pyrethrum can be used as general-purpose insecticides.
 <b>BRODIFACOUM</b> (An anticoagulant rodenticide used in d-CON, Talon-G, and other products.)	Brodifacoum is an increasingly popular active ingredient in pellet baits and bait blocks for rats and mice.	Brodifacoum is an anticoagulant vitamin K inhibitor normally placed in pellets and bait blocks made from cereal grains. Feeding on the bait hinders blood clotting and causes internal bleeding, which leads to a slow death, normally over a period of several days.	Brodifacoum accumulates in the liver. The pellets, normally placed in the crawl space beneath your house, can last for more than four months and are toxic to wildlife. Most wildlife poisonings occur when raptors such as hawks or owls eat poisoned rodents. Even if the amount of poison ingested isn't enough to kill a bird, it keeps blood from clotting, so normally non-lethal injuries such as bites or scrapes can cause the bird to bleed to death. Brodifacoum use has risen sharply in recent years, as have reported wildlife poisonings from it.		Traps and exclusion are still the weapons of choice against rodents. For traps, try tying a piece of a cotton ball to the trigger instead of food, or use the old standby: peanut butter. (For those too squeamish to use traps, try products containing warfarin or cholecalciferol.) Mouse-proof your house by eliminating food and water sources and sealing cracks, areas around pipes, and other points of entry.
 <b>2,4-D</b> (A chlorinated phenoxy herbicide used in Scotts Turf Builder Plus 2, Weed-B-Gon, and other products.)	The most commonly used pesticide in the home and garden market, 2,4-D is a systemic herbicide used to control many broadleaf weeds in gardens and lawns. It is commonly mixed with water to form a milky liquid spray.	An herbicide and plant-growth regulator, 2,4-D is readily absorbed by broadleaf plants. It first causes uncontrolled growth in broadleaf plants, then, as more chemical is taken up, it cuts the growth cycle abruptly, resulting in malformed leaves, stems, and roots, and eventual death.	2,4-D has caused serious skin and eye irritation in agricultural workers, and in commercial use can carry the EPA's highest warning label: "DANGER-POISON." Several studies have linked 2,4-D exposure to cancer, though these results have been hotly contested. It is readily absorbed through the skin or through inhalation but doesn't appear to accumulate in the body. It is slightly to moderately toxic to birds. Some formulations are highly toxic to fish and aquatic plants. It's the third most common herbicide found in urban streams.		Try soap-based spot sprays, hand weeding, mowing, dethatching, aerating, and maintaining a healthy lawn to crowd out weeds. Use organic fertilizers and plant grass mixtures suited to your climate.
 <b>GLYPHOSATE</b> (An aliphatic herbicide used in Roundup and other products.)	Glyphosate may be America's favorite all-purpose weed killer. It's a nonselective herbicide, which means it kills virtually anything that is green, including annuals, perennials, grasses, sedges, broadleaf weeds, and woody plants.	When sprayed on foliage, glyphosate is readily absorbed and quickly moves throughout the plant. It disrupts amino-acid synthesis, causing white spots or streaks on leaves and eventual cell and plant death.	Some formulations of glyphosate are nearly nontoxic to humans, while others (particularly the trimethylsulfonium salt) are more dangerous if ingested. It is usually nontoxic through skin exposure, but some versions can be extremely irritating to the skin or eyes and acutely toxic through inhalation, so make sure you read the label carefully. It binds tightly to soil particles, so its leaching potential is low. Some formulations are more toxic to aquatic species than others, but in general, risk to fish is low. It's also nontoxic to honeybees and virtually nontoxic to earthworms.		Try better mowing techniques, mulching and weeding your garden, or spot treatment of plants with soap-based sprays. See the back of this chart for tips on growing a vigorous lawn that will crowd out weed species.
 = <b>INSECTICIDE</b>	<b>EPA TOXICITY RATINGS</b> Most pesticides are designed to kill something and must be used with care. The EPA requires labeling products WARNING, CAUTION, or DANGER-POISON to alert consumers to their toxicity. These designations are partially based on the acute "lethal dose 50" (LD50) of the active ingredients—the amount in milligrams per kilogram of body weight necessary to kill half a sample population of mice. The lower the LD50, the more toxic the pesticide. Products with WARNING or DANGER (products that need a DANGER label are restricted in use) can also cause severe burning. Labels vary based on formulations, so read the instructions carefully.			 = <b>CAUTION</b> LD50 of 500 to 5,000	
 = <b>RODENTICIDE</b>				 = <b>WARNING</b> LD50 of 50 to 500	
 = <b>HERBICIDE</b>				 = <b>DANGER-POISON</b> LD50 of 0 to 50	

SOURCES: EPA Ecological Incident Information System database; EPA National Pesticide Telecommunications Network; EPA list of Reduced-Risk Pesticides; Rodale Institute; Bio-Integral Resource Center