

HEALTHY HOMES. HEALTHY FAMILIES.

Grow Smart, Grow Safe



A consumer guide to lawn and garden products

600 pest controls and fertilizers reviewed for health
and environmental hazards

Sixth edition



Metro



Local Hazardous Waste
Management Program
in King County, Washington

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For downloadable copies of this guide, visit www.oregonmetro.gov/growsmart or www.govelink.org/hazwaste/house.

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Disclaimer

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Contents

Introduction	
Gardening with nature	3
Chapter 1	
Insect controls	9
Chapter 2	
Slug and snail controls	19
Chapter 3	
Disease controls	23
Chapter 4	
Weed controls	29
Chapter 5	
Moss controls	41
Chapter 6	
Animal pest controls	45
Chapter 7	
Fertilizers and soil amendments	53
Chapter 8	
Resources	65



Quick reference

Reading pesticide labels	5
Using this guide	6
Understanding the hazard ratings	7
Pesticide disposal information	70
Index of reviewed products	72



Gardening with nature

Like others in your community and beyond, you may enjoy the beauty and bounty that a garden offers but wonder about the effects of garden chemicals. It's a pretty serious issue. Insecticides, herbicides and other such chemicals can harm people and pets and pollute the environment. Many garden products developed in the last 60 years contain toxic ingredients that fight nature rather than work with it, altering a garden's natural balance.

Times are changing. Whether working the land for subsistence, a hobby or a profession, an increasing number of people are seeking ways to grow and maintain their gardens effectively and sustainably. From using compost and mulch to watering wisely and reducing reliance on harmful chemicals, more people are gardening with nature, gaining the benefits of organic practices and getting results.

Grow Smart, Grow Safe can help you garden with nature, too. With ratings of 600 pesticides, fertilizers and soil amendments, this publication offers a comprehensive guide to lawn and garden products. The easy-to-use tables organize entries into categories that help you find lawn and garden products least hazardous to your pets and loved ones, wildlife, lakes, streams and groundwater. In addition, tips from regional experts offer simple ways to reduce pest problems without toxics and safely grow a productive, healthy garden.

Happy gardening, and thank you for choosing this guide.

Take simple steps to prevent garden pest problems

Here are five steps you can take to work with nature in your yard. If you maintain your garden's natural balance, you will have healthier plants and fewer pest problems. This means less time and effort in the long run.

- 1. Build healthy soil with compost and mulch.** Soil is alive, and soil life matters. A teaspoonful of healthy soil contains about 4 billion beneficial soil creatures. They improve soil structure and recycle nutrients. They also store water for plants and protect plants from pests and diseases.
- 2. Plant right for your site.** Get to know your yard. Areas of shade, or wet or dry soil, affect which plants will grow well. Choose plants that are likely to thrive in these different conditions. Pick plants that resist insects and diseases. Group plants by their needs for water, sun and soil. See "Resources" on page 67 for help.
- 3. Practice smart watering.** Many plant problems are caused by overwatering. Water plants deeply to promote deep roots. Then let the surface of the soil partly dry out before watering again.
- 4. Learn to live with a few insects.** Most bugs in your garden are actually helpful. Killing them all would eliminate the beneficial insects too, making the problem worse.
- 5. Practice natural lawn care.** People often use the most chemicals and water on their lawns. Instead, mow high (2 to 3 inches) and mow regularly. Leave the clippings for free fertilizer. Use "natural organic" or "slow-release" fertilizers. Water deeply – 1 inch once a week during the dry season – to moisten the whole root zone, and let the soil dry out between waterings. This prevents lawn disease and saves water.

Take targeted action if pests appear

"Pest" is a broad term that includes problem insects, weeds, slugs and snails, critters such as deer and moles and plant diseases such as black spot.

Get expert help to identify the problem and your options to deal with it. Sometimes simple steps, such as more sunlight or less water, are all the plant needs. Sometimes traps, barriers or other tools may be enough. See each chapter for recommendations from regional experts. Also see "Resources" on page 67.

Use this guide to choose the least-hazardous products. More products are on the market every year that work well and pose less risk. Look for products in the green section of the tables in each chapter. Consider products in the yellow sections carefully, and avoid those in the red sections.

If you buy garden chemicals, buy in small amounts, skipping the large "economy" size. Favor ready-to-use products over concentrates. You will reduce worries about keeping chemicals away from children and pets and disposing of leftovers.

Avoid combination products such as weed and feed. Separate fertilizers from pest controls, so you don't waste your time and money overapplying one or the other.

Spot-spray small amounts – and only on targeted plants – if you spray. The more you spray, the more you throw your garden's natural balance out of whack.

What to look for on a pesticide label

Pesticide labels can be detailed but confusing. Here are a few key things to look for.

Active ingredients

Chemicals included to kill the pest.

Inert ingredients

Everything else – such as water or chemicals – often collectively described as “other ingredients.” Often they compose the bulk of the product and include “trade secret” ingredients with unknown hazards.

Precautionary statements

Hazards to people – especially children – and pets.

Directions for use

Methods to use the product properly. Check for protective clothing and gear requirements. Never apply more than recommended.

Environmental hazards

Hazards to water quality, birds and other wildlife.



Some pest control products may have the OMRI (Organic Materials Review Institute) label. OMRI is a private nonprofit group that tests and certifies that products meet the U.S. Department of Agriculture's National Organic Program. Products that meet this standard generally are safer. As with any pesticide, however, OMRI-listed products should be used carefully.

Using this guide

The sheer variety of lawn and garden brands and products may seem overwhelming, but Grow Smart, Grow Safe offers simple steps to finding the least-hazardous options that match your needs. This section explains how to search the guide for information by topic – moles, for example – or by product name. It also helps you understand the product tables and rating system.

Environmental Protection Agency (EPA) registration

Lowest hazard: Lowest toxicity or environmental hazards. Consider these first.

Moderate hazard: Moderate toxicity and environmental hazards. Choose products with health and environmental ratings posing the least hazards to your site.

Highest hazard: Highest toxicity and environmental hazards. Avoid product or consider as a last resort.

Sample table

Health and environmental hazard categories

EPA-registered pesticide products	Health and environmental hazard categories						Active ingredients
	Short-term health hazard	Long-term health hazard	Hazard to aquatic life	Hazard to birds, bees or pets	Half-life in soil	Water pollution hazard	
NON-SELECTIVE, POST-EMERGENT Weed controls							
These products are used on <i>existing</i> weeds. They will kill or damage all plants, including lawn.							
LOWEST HAZARD							
Concern® Fast-Acting Weed Killer®	○	?	○	○	○	?	ammoniated salts of fatty acids
Garden Safe Brand Weed & Grass Killer	○	?	○	○	○	?	ammoniated salts of fatty acids
Safer® Fast Acting Weed & Grass Killer RTU	○	?	?	?	○	○	potassium salts of fatty acids
MODERATE HAZARD							
Eliminator® Weed & Grass Killer II RTU	○	?	○	○	●	○	glyphosate isopropylamine salt
Roundup® Weed & Grass Killer RTU Plus	○	?	○	○	●	○	glyphosate, pelargonic acid
Roundup® Weed & Grass Killer Super Concentrate	○	?	○	○	●	○	glyphosate
HIGHEST HAZARD							
Espoma® Earth-tone®: 4 in 1 Weed Control Concentrate	●	?	●	○	○	●	ammoniated salts of fatty acids, maleic hydrazide
Roundup® Extended Control® Weed & Grass Killer Plus Weed Preventer Concentrate	○	?	●	○	●	○	glyphosate, diquat dibromide, imazapic ammonium

Product name

Products lower on the table are more hazardous.

Differences between close-ranking products may not be significant. Each table may span several pages.

Searching by topic

For pest, disease and weed controls or fertilizers by topic, check the table of contents for the entry that most closely matches your interest. Looking for solutions on moles? Turn to the “Animal controls” chapter. Each chapter begins with an overview of the topic – including background details and experts’ tips – followed by a table of products ranked from lowest to highest hazard.

Searching by product name

Got a specific product in mind? Search the alphabetized product index at the back of the guide to find the applicable page numbers. If the specific product isn’t listed, check the index for similar products that contain the same active ingredients.

What do the hazard ratings mean?

The tables, which show the hazard ratings, are based on evaluation criteria reviewed by scientists and other experts. The hazard-rating system uses information from product labels, material safety data sheets and toxicology references. Product effectiveness was not tested.

Short-term health hazard

Poses hazards from eating, drinking or breathing fumes from the product or getting it on skin or in eyes. Based on U.S. Environmental Protection Agency toxicity categories for pesticides.

- Nontoxic to moderately toxic or irritating to skin or eyes. Label includes the term "caution."
- Very toxic or severe-but-reversible skin or eye irritant. Label includes the term "warning."
- Extremely toxic. Label includes the term "danger."
- ? Not enough information available.

Long-term health hazard

Contains ingredients that one or more government agencies have listed as causing cancer, reproductive toxicity or other delayed health effects. Rating is based on the scientific certainty that the chemical can cause these effects rather than the likelihood that they will occur from limited exposure.

- All ingredients are known. Product contains no ingredient listed as a known or suspected human carcinogen (chemical that causes cancer) or reproductive or developmental toxicant.
- Product contains possible carcinogen or ingredient that has been associated with long-term health effects.
- Contains known, likely or probable human carcinogen or listed reproductive or developmental toxicant.
- ? Not enough information available.

Hazard to aquatic life

- Product presents no hazard to fish or other aquatic life or label does not contain aquatic toxicity warnings.
- Product label warns of toxicity to fish or other aquatic life.
- Product label warns of high toxicity to fish or other aquatic life.
- ? Not enough information available.

Hazard to birds, bees or pets

(based on selectivity of active ingredients)

- Practically nontoxic to birds, bees and other beneficials. No label warnings of toxicity to wildlife.
- Product label warns of toxicity to birds, insects or pets, or product is known to be a broad-spectrum insecticide.
- Product label warns of high toxicity to birds, insects, wildlife or pets.
- ? Not enough information available for rating.

Half-life* in soil

- Less than 30 days
- 30-99 days
- 100 days or more
- ? Not enough information available for rating.

* Half-life is the time required for half the amount of applied pesticide to be completely degraded.

Water pollution hazard

Contains active ingredients that may be leached out of the root zone by rain or irrigation water, or wash off the surface of the land.

- Low to extremely low mobility in soil
- Moderate mobility
- High to very high mobility
- ? Not enough information available.



The meadow hawk eats aphids and other garden pests.

1 Insect controls

A healthy garden has fewer pest problems. If you choose plants that are right for your yard and keep them healthy, your garden is less likely to have insect problems. Sometimes, even the best cared-for gardens have aphids, cutworms or other pest infestations. There are steps you can take to deal with the problem naturally. If you decide to use a pesticide, the tables in this chapter will help you choose the safest products.

“Good bugs” are your friends.

Most insects in your yard are helpful. They will:

- eat pests that harm your plants
- pollinate fruit trees and berries
- eat plant waste and break it down into fertilizer
- serve as food for birds and animals that also eat pests
- aerate and improve your soil.

Prevent

Choose plant varieties that are pest-resistant. Some rhododendrons, for example, are less likely to suffer damage from root weevils, and native plants also have fewer pest problems. In addition, more pest-resistant varieties come on the market every year.

Choose plants that attract birds and good bugs. Both birds and beneficial insects eat pests. Plants that provide nectar and pollen attract beneficial insects. Trees, flowering plants and shrubs with berries attract birds.

Keep your plants healthy. Build healthy soil, and give your plants the water they need. They will grow strong and be less prone to insect damage.

Replace problem plants. If a plant is infested intolerably every year, perhaps it's not worth the trouble. You may want to replace it with something that will stay healthy in your garden.

Observe

Stroll through your garden often. Find out which plants appear happy and which may need more attention. Is the insect near a damaged plant eating the leaves, or is it eating pests? Get help identifying insects, so you don't kill a helper. See "Resources," beginning on page 65.

Be realistic. Your yard will always have insects, and your plants won't always be picture-perfect. Insects have been around for 400 million years. Low levels of pests keep birds and good bugs in your yard. This helps control pests.

Manage

Use physical and cultural controls. These are the least-hazardous methods. A forceful water spray knocks aphids off plant leaves and works as well as a pesticide. Sticky tape will keep root weevils from climbing up your rhododendrons. Traps are effective against wasps, moths and whiteflies.

Use biological controls. You can purchase predators such as lacewings or parasitic wasps. *Bacillus thuringiensis* (Bt) is a naturally occurring bacterium that produces a toxin that controls caterpillars. Beneficial nematodes are tiny worms that control root weevils, crane flies and other pests that live in the soil.

Use pesticides only as a last resort. Pesticides pose varying risks to people and pets and also commonly kill beneficial insects. Pests tend to bounce back more quickly than beneficial insects that eat pests, leading to even more pests later. Minimize pesticide use by spot-spraying instead of selecting broadcast application.

Choose products under the green bar in the table on the following pages. The ones lower in the table are more likely to be toxic to birds, bees and fish. They also may harm children and pets.

Learn

Evaluate how well the various strategies work for your pest problems. Take your time observing any changes occurring in your pest populations and garden plants. Perhaps you won't entirely get rid of a pest with one simple nontoxic method. If you reduce pest numbers, you will ultimately spray fewer chemicals.

Insect controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Cultural, physical and capture methods, including traps and pheromone attractants

LOWEST HAZARD

	Short-term health hazard	Long-term health hazard	Hazard to aquatic life	Hazard to birds, bees or pets	Half-life in soil	Water pollution hazard	Active ingredients
Beneficial bugs/ ladybugs							
Squish/swat/stomp							
Water spray							
Victor® Window Fly Trap							sticky glue
Mountain Bluebird® Spider Elimination Kit							sticky glue
Pic® Yellow Jacket & Wasp Trap							none
Pic® Fly Ribbon							rosin-rubber mineral oil
Pic® Window Fly Trap							glue trap
Safer® Sticky Whitefly Trap							sticky glue
Seabright Laboratories Sticky Thrip Leafminer Trap							sticky glue
Tanglefoot® Sticky Tree Bands							natural gum resins
Tanglefoot® Tree Tangle Foot Pest Barrier							castor oil, natural gum resins, vegetable wax
Victor® Flycatcher Fly Ribbon							sticky glue
Bug zappers							electronic
Oak Stump Farms® Apple Maggot Trap							bait
Oak Stump Farms® Fly Lure							bait
Oak Stump Farms® Codling Moth Trap							bait
Oak Stump Farms® Mosquito and Flying Insect Bait Trap							pheromone bait
Oak Stump Farms® Yellow Jacket & Wasp Trap (or Lure)							fruit-juice bait
Raid® Yellow Jacket Trap							attractant
Raid® Disposable Yellow Jacket Trap							attractant
Rescue® Yellow Jacket Trap (and Attractant)							attractant
Rescue® Fly Trap (and Attractant)							attractant
Safer® Gypsy Moth Trap							pheromone bait
Oak Stump Farms® Aphid Chaser							pheromone biochemical
Tanglefoot® Codling Moth Trap							pheromone bait
Victor® Fly Magnet™ Bag Trap							pheromone bait
Victor® Poison-Free® Hobo Spider Trap							pheromone bait
Victor® Yellow Jacket Magnet® Bag Trap							attractant
Victor® Poison-Free® Disposable Fly Traps with Bait							food bait

continued on next page

○ Lowest hazard

○ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

□ Products and methods not EPA-regulated may pose risks to the user and/or the environment. Follow all instructions and cautions on labels.

Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Insect controls

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Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

Low-toxicity pesticide products exempt from EPA registration process. All considered low risk, but note cautions.

LOWEST HAZARD

Green Light® Organic Rose & Flower Spray RTU										rosemary oil
Green Light® Organic Rose & Flower Spray Concentrate										rosemary oil
Green Light® Organic Home & Garden Insect Spray										thyme oil
New Mountain 100% Natural Sandalwood Mosquito Sticks®										citronella oil, geraniol
Pharm Solutions Oil Pharm Organic Summer Oil										certified organic soybean oil, rosemary oil
Pharm Solutions Flower Pharm										cottonseed oil, rosemary oil, cinnamon oil
Pharm Solutions Rose Pharm										cottonseed oil, rosemary oil, peppermint oil
Pharm Solutions Garlic Pharm										garlic oil
Pharm Solutions Veggie Pharm										garlic, peppermint oil, rosemary
Summit® Mosquito Dunks®										bacillus thuringiensis
Natural Guard® Lawn, Plant, and Pet Insect Spray										cedar oil
Green Light® Organic Insect Control Concentrate										thyme oil, sesame oil, clove oil
Off® Citronella Bucket										citronella oil
Organocide™ Organic Insecticide Fungicide RTU										sesame oil
Organocide™ Organic Insecticide Fungicide Concentrate										sesame oil, fish oil, lecithin
Pic® Citronella Sticks										citronella oil
Schawbel Colorfusion™ Citronella Candle										citronella oil
Scotts® Outdoor Defense Citronella Candle										citronella oil
Victor® Poison-Free® Ant & Roach Killer										mint oil
Victor® Poison-Free® Flying Insect Killer										mint oil
Victor® Poison-Free® Wasp & Hornet Killer										mint oil, sodium lauryl sulfate

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- Lowest hazard
- ◐ Moderate hazard
- Highest hazard

- NA** Not applicable
- ?** Not enough data

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Insect controls

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 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

LOWEST HAZARD

Lilly Miller® Vegol™ Growing Season Spray Oil	○	○	○	○	○	○	canola oil
Lilly Miller® Vegol™ Year Round Pesticidal Oil Concentrate	○	?	○	○	○	○	canola oil
Quick Kill Mosquito Bits™	○	○	○	○	○	○	bacillus thuringiensis
Safer® Ant & Crawling Insect Killer	○	?	○	○	NA	○	amorphous diatomaceous earth (silicon dioxide)
Safer® Diatomaceous Earth	○	?	○	○	NA	○	silicon dioxide
Safer® Garden Dust	○	?	○	○	○	○	bacillus thuringiensis
Safer® Caterpillar Killer	○	?	○	○	○	○	bacillus thuringiensis
St. Gabriel Organics Diatomaceous Earth Insect Dust	○	○	○	○	NA	○	silicon dioxide, other oxides
Stinger® Nosquito® Mosquito Octenol Lure	○	○	○	○	NA	○	1-octen-3-ol
VPG® Natural Guard® Crawling Insect Control	○	○	○	○	?	?	silicon dioxide
Raid® Earth Options Ant & Roach Killer	○	○	○	○	?	?	eugenol, 2-phenethyl propionate
Stinger® Nosquito® 2 in 1 Power Bait	○	○	○	○	NA	○	1-octen-3-ol, lactic acid

MODERATE HAZARD

Lilly Miller® Worry Free® Insecticidal Soap	○	○	●	○	○	○	potassium salts of fatty acids
Espoma® Earth-tone® Insecticidal Soap	○	○	●	○	○	○	potassium salts of fatty acids
Orange Guard® Kills on Contact	○	○	●	○	○	○	d-Limonene (orange peel extract)
Lilly Miller® Hose 'n Go® Dormant Spray for Insects	○	○	●	○	○	○	petroleum oil
Lilly Miller® Superior Type Spray Oil	○	○	●	○	○	○	petroleum oil
Ortho Volck® Oil Spray	○	○	●	○	○	○	petroleum oil
Green Light® Tomato & Vegetable Spray RTU	○	?	○	●	○	○	neem oil
Green Light® Plant & Flower Protector RTU	○	?	○	●	○	○	neem oil
Green Light® Rose Defense® RTU	○	?	○	●	○	○	neem oil
Safer® BioNEEM® Insecticide & Repellant	○	?	●	○	○	○	azadirachtin

continued on next page

○ Lowest hazard

● Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Insect controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

MODERATE HAZARD

Product	Short-term health hazard	Long-term health hazard	Hazard to aquatic life	Hazard to birds, bees or pets	Half-life in soil	Water pollution hazard	Active ingredients
Safer® Insect Killing Soap	○	?	●	○	○	○	potassium salts of fatty acids
Safer® Fruit & Vegetable Insect Killer II	○	?	●	○	○	○	potassium salts of fatty acids
Safer® Rose & Flower Insect Killer II	○	?	●	○	○	○	potassium salts of fatty acids
Safer® 3 in 1 Garden Spray RTU	○	?	●	○	NA	○	potassium salts of fatty acids, sulfur
Safer® 3 in 1 Garden Spray Concentrate	○	?	●	○	NA	○	potassium salts of fatty acids, sulfur
Monterey Garden Insect Spray	○	○	●	●	○	○	spinosad
Natural Guard® Spinosad Landscape & Garden Insecticide	○	○	●	●	○	○	spinosad
Lilly Miller® Systemic Rose, Shrub & Flower Care	○	●	○	●	○	○	acephate
Real Kill® Ant Bait	○	○	○	●	●	○	indoxacarb
Green Light® Rose Defense® 70%	○	?	●	●	○	○	neem oil
Terro® Ant Dust	○	○	●	●	○	○	deltamethrin
Hi-Yield® Turf Ranger Insect Control Granules	○	○	●	●	○	○	deltamethrin
Green Light® Rose Defense® II RTU	○	●	○	●	●	○	neem, pyrethrins, piperonyl butoxide
Safer® Tomato & Vegetable Insect Killer II RTU	○	●	●	●	○	○	potassium salts, pyrethrins
Safer® Yard & Garden Insect Killer II	○	●	●	●	○	○	potassium salts, pyrethrins
Safer® Flying Insect Killer	○	●	●	●	○	○	d-Limonene, pyrethrins, potassium salts of fatty acids
Spectracide® Destroyer™ Wasp & Hornet Killer	○	○	●	●	●	○	prallethrin, lambda-cyhalothrin
Surefire® Crawling Insect Killer	○	●	●	●	○	○	d-Limonene, pyrethrins, potassium salts of fatty acids
Lilly Miller® Worry Free® Garden Insect Control	○	●	●	●	○	○	pyrethrins, canola oil

continued on next page

- Lowest hazard
- Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products							Active ingredients
HIGHEST HAZARD							
Spectracide® Bug Stop® Indoor Plus Outdoor Insect Killer	○	?	●	●	●	○	lambda-cyhalothrin
Spectracide® Terminate® Termite & Carpenter Ant Killer 2	○	?	●	●	●	○	lambda-cyhalothrin
Ultra Kill™ Home Insect Killer	○	?	●	●	●	○	lambda cyhalothrin
Lilly Miller® Grasshopper, Earwig, Cutworm & Sowbug Bait	○	●	○	●	○	○	carbaryl
Ortho® Total Kill™ Lawn & Garden Insect Killer	○	●	●	●	○	○	bifenthrin
Ortho® Season Long Control Insect Killer for Lawns	○	●	●	●	○	○	bifenthrin
Ortho® Home Defense MAX® Insect Killer Granules	○	●	●	●	○	○	bifenthrin
Ortho® Bug-B-Gon® MAX® Insect Killer for Lawns Granules	○	●	●	●	○	○	bifenthrin
Raid® Outdoor Ant Spikes	○	●	●	●	○	○	avermectin
Scotts® Ortho® Max Garden & Landscape Insect Killer	○	○	●	●	●	○	esfenvalerate
Spectracide® Triazicide® Insect Killer Once & Done!™ Granules	○	○	●	●	●	○	lambda-cyhalothrin
Terro® Carpenter Ant & Termite Killer Concentrate	○	●	●	●	●	○	permethrin
ThermaCELL® Mosquito Repellent Lantern	○	●	●	●	○	○	d-cis/trans allethrin
Chemsico Real Kill Ant Killer 2	○	●	●	●	●	○	d-trans allethrin, lambda cyhalothrin
Master Nursery® Pest Fighter® Rose & Flower Insect Spray RTU	○	●	●	●	●	○	permethrin, tetramethrin
Ortho® Total Kill™ Wasp & Hornet Killer	○	●	●	●	●	○	tetramethrin, phenothrin
Ortho® Home Defense MAX® Wasp & Hornet Killer	○	●	●	●	●	○	tetramethrin, phenothrin
Scotts® Outdoor Defense Insect Killer Area Fogger	○	●	●	●	●	○	permethrin, tetramethrin
Spectracide® Garden Insect Killer	○	●	●	●	●	○	pyrethrins, pipernol butoxide
Spectracide® Bug Stop® for Gardens	○	●	●	●	●	○	pyrethrins, pipernol butoxide

continued on next page

- Lowest hazard
- Moderate hazard
- Highest hazard

NA Not applicable
 ? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Insect controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products							Active ingredients
HIGHEST HAZARD							
SpectracidePRO® Wasp & Hornet Killer	○	●	●	●	●	○	tetramethrin, permethrin, piperonyl butoxide
Terro® Mosquito Killer Yard & Patio Fogger	○	●	●	●	●	○	permethrin, tetramethrin, related reaction products
Terro® Ant Killer Outdoor	○	●	●	●	●	○	permethrin, tetramethrin, related products
Terro® Spider Killer Spray	○	●	●	●	●	○	permethrin, pyrethrins, piperonyl butoxide
Terro® Carpenter Ant & Termite Killer Spray	○	●	●	●	●	○	permethrin, tetramethrin, piperonyl butoxide
Ultra Kill™ Wasp & Hornet Killer	●	○	●	●	●	○	prallethrin, lambda-cyhalothrin
Spectracide® Triazicide® Insect Killer Once & Done!™	○	?	●	●	●	○	lambda-cyhalothrin
Spectracide® Ant Shield® Home Barrier Granules 2	○	?	●	●	●	○	lambda-cyhalothrin
Terro® Ant Killer Plus Multi-purpose Insect Control 2	○	?	●	●	●	○	lambda-cyhalothrin
Hi-Yield® Kill-A-Bug II Lawn Granules	○	●	●	●	●	○	permethrin
HotShot® Ultra Liquid Ant Bait	○	○	●	●	●	●	dinotefuran
Ortho® Bug-B-Gon® MAX® Garden & Landscape Insect Killer RTU	○	○	●	●	●	○	esfenvalerate
Ortho® Rose & Flower Insect Killer	○	●	●	●	○	○	bifenthrin
Ortho® Max Lawn and Garden Insect Killer Granules	○	●	●	●	○	○	bifenthrin
Ortho® Bug-B-Gon® MAX® Lawn & Garden Insect Killer Concentrate	○	●	●	●	○	○	bifenthrin
Ortho® Home Defense MAX® Termite and Destructive Bug Killer Concentrate	○	●	●	●	○	○	bifenthrin
Spectracide® Ant Shield® Home Barrier Granules	○	●	●	●	●	○	permethrin
Spectracide® Carpenter Ant and Termite Killer	○	●	●	●	●	○	permethrin
Spectracide® Triazicide® Insect Killer 2 Once & Done!™	○	○	●	●	●	○	gamma-cyhalothrin
Spectracide® Malathion Insect Spray	●	●	●	●	○	○	malathion

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○ Lowest hazard

● Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Insect controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

HIGHEST HAZARD

Terro® Ant Killer Plus Outdoor Multi-purpose Insect Control	○	●	●	●	●	○	permethrin
Ortho® Malathion Plus® Insect Spray Concentrate	●	●	●	●	○	○	malathion
HotShot® Flying Insect Killer	○	●	●	●	●	○	permethrin, d-trans allethrin
Corry's® Bug Bait	○	●	●	●	○	○	metaldehyde, carbaryl
Ortho® Bug-Geta® Plus Slug, Snail and Insect Killer	○	●	●	●	○	○	metaldehyde, carbaryl
Repel® Outdoor Fogger, Camp Fogger	○	●	●	●	●	○	tetramethrin, related compounds, permethrin, piperonyl butoxide
Spectracide® Systemic Rose & Flowering Shrub Insect Control & Fertilizer	○	○	●	●	●	●	dinotefuran and fertilizer
Spectracide® Systemic Tree & Shrub Insect Control & Fertilizer	○	○	●	●	●	●	dinotefuran and fertilizer
Spectracide® Ant Shield® Home Barrier Insect Killer 2	○	●	●	●	●	○	piperonyl butoxide technical, pyrethrins, permethrin
Spectracide® Commercial Wasp & Hornet Killer 2	○	●	●	●	●	○	tetramethrin, permethrin, piperonyl butoxide
Ortho® Ant-B-Gon® Dust	●	●	●	●	●	○	permethrin
Ortho® Total Kill™ Brand Lawn and Garden Insect Killer Concentrate	○	●	●	●	●	○	permethrin
Off® Mosquito Coil III	○	?	●	●	NA	?	d/l-allethrolene d-trans chrysanthemate
Hi-Yield® 38 Plus Turf, Termite & Ornamental	○	●	●	●	●	○	permethrin
Off® PowerPad® Lamp/Lantern and Refills	○	●	●	●	?	?	d-cis/trans allethrin
Spectracide® Immunox® Plus Insect & Disease Control Concentrate	○	●	●	●	●	●	myclobutanil, permethrin
Spectracide® Immunox® 3-in-1 Insect & Disease Control Plus Fertilizer	○	●	●	●	●	●	myclobutanil, permethrin
Ortho® Ant-B-Gon® Bait	○	●	●	●	●	●	propoxur
Scotts® GrubEx® Season-Long Grub Control	○	○	●	●	●	●	imidacloprid
TAT® Ant Bait	○	●	●	●	●	●	propoxur
Ortho® Orthenex® Insect & Disease Control Aerosol	●	●	●	●	●	●	acephate, triforine, resmethrin

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- Lowest hazard
- Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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Insect controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

HIGHEST HAZARD

Ortho® Systemic Insect Killer Concentrate	●	●	◐	●	◐	○	acephate, fenbutatin oxide
Ortho® Orthenex® Garden Insect & Disease Control Concentrate	●	●	◐	●	◐	◐	orthene, triforine, fenbutatin

- Lowest hazard
- ◐ Moderate hazard
- Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.



A copper barrier protects seedlings.

2 Slug and snail controls

Slugs and snails love to munch on tender garden plants. They can leave large, ragged holes in leaves and flowers and mow down an entire row of lettuce sprouts. Although young plants are especially vulnerable to snail and slug damage, some established plants can be damaged, too. There are many things you can do to reduce slug and snail damage. However, you can't control these pests with one method alone. If you decide to use a pesticide, the tables in this chapter will help you choose the safest products.

Prevent

Get rid of hiding places. Slugs and snails like to hide under pots, boards and plants. Clean up around plants these pests favor. Remove weeds after you pull them. Remove leaves and stems after you prune. Keep paths clear of overgrown plants.

Choose plants slugs and snails don't like. Which plants have been nibbled on in your garden? Maybe you could try growing something else. For example, slugs are fond of dahlias but not geraniums. Most ornamental grasses and woody plants are not affected much by slugs and snails.

Keep slugs and snails away from their favorite plants. Copper is a good choice for a barrier. Install copper screens or flashing around planting beds. Wrap copper foil around planting boxes or trunks. The next best thing is a least-toxic bait used around seedlings when they are young and vulnerable. Once seedlings mature, they can withstand a little nibbling.

Observe

It is easiest to control slug and snail problems if you catch them early. Walk through your garden often to keep track of vulnerable plants. Take action at the first sign of damage.

Manage

Handpick slugs and snails. They are most active at night and on damp, cool mornings. Use a flashlight to look for them, and drop them into a jar of soapy water. In the fall, look for and destroy pearly clusters of eggs.

Use simple traps. Flower pots turned upside down or boards raised an inch off the ground make good traps. Scrape off and dispose of slugs and snails. Beer traps are somewhat effective, but they must be covered to keep out rain and refilled every few days.

Use a least-toxic slug bait made with iron phosphate. Look for brand names such as Sluggo®, Worry Free® and Escar-go!®, which are safe for use around children, pets, birds, fish and other wildlife. However, baits alone will not be enough to control snails or slugs.

Consider more-hazardous chemical baits only as a last resort. Baits containing metaldehyde are poisonous to dogs and cats. Some may attract dogs, because they look like dog food. Baits may also contain carbaryl, which is toxic to beneficial insects and fish. A tamper-proof bait station may help protect children and pets.

Learn

Evaluate how well the various strategies worked. Keep track, so you can be even more effective next time.

Slug and snail controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

Cultural, physical and capture methods, including traps and pheromone attractants

LOWEST HAZARD

Pick and squish							
Homemade slug and snail traps							inverted melon rind, beer, boards, bowls
Safer® Slug & Snail Copper Barrier Tape							copper barrier
Slug-X Trap							beer
Oak Stump Farms® Slug Lure							vegetable-based bait
Oak Stump Farms® Slug Trap							vegetable-based bait
Contech SlugsAway® Electronic Slug and Snail Fence							electric charge

EPA-registered pesticide products

LOWEST HAZARD

Bayer Advanced™ Dual Action Snail & Slug Killer Bait	○	?	○	○	NA	○	iron phosphate
Gardens Alive!® Escar-Go!® Slug & Snail Bait	○	?	○	○	NA	○	iron phosphate
Garden Safe® Slug & Snail Bait	○	?	○	○	NA	○	iron phosphate
Lilly Miller® Worry Free® Ferramol Slug & Snail Bait	○	?	○	○	NA	○	iron phosphate
Monterey Sluggo®	○	?	○	○	NA	○	iron phosphate

MODERATE HAZARD

Gardens Alive!® Escar-Go!® Supreme™ Insect, Slug & Snail Bait	○	?	⦿	○	○	○	iron phosphate, spinosad
Monterey Sluggo Plus® Insect, Slug, and Snail Pellets	○	?	⦿	○	○	○	iron phosphate, spinosad
Lilly Miller® Snail & Slug Spray RTU	○	⦿	○	●	○	○	metaldehyde
Eliminator® Snail & Slug Bait II	○	⦿	○	●	○	○	metaldehyde
Corry's® Slug & Snail Death (Original & Pellets)	○	⦿	○	●	○	○	metaldehyde
Corry's® Slug & Snail Pellets (MP)	○	⦿	○	●	○	○	metaldehyde
Lilly Miller® Slug & Snail Bait	○	⦿	○	●	○	○	metaldehyde
Lilly Miller® Snail & Slug Mini-pellets	○	⦿	○	●	○	○	metaldehyde
Corry's® Liquid Slug & Snail Control	○	⦿	○	●	○	○	metaldehyde

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- Lowest hazard
- ⦿ Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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Slug and snail controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

MODERATE HAZARD

Deadline® Force II™ Slug & Snail Killer	○	◐	○	●	○	○	metaldehyde
Deadline® Rain Tough™ Slug & Snail Killer	○	◐	○	●	○	○	metaldehyde
Green Light® Snail and Bug Bait	○	◐	○	◐	?	?	orthoboric acid
Lilly Miller® Hose 'n Go Slug & Snail Spray	○	◐	○	●	○	○	metaldehyde
Lilly Miller® Slug + Snail Spray Hose 'n Go	○	◐	○	●	○	○	metaldehyde, tetraoxycyclo-octane

MOST HAZARD

Cooke® Pest Granules	○	●	●	●	○	○	carbaryl, metaldehyde
Lilly Miller® Slug, Snail & Insect Killer Bait	○	●	●	●	○	○	carbaryl, metaldehyde

○ Lowest hazard

◐ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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The grandiflora rose “Tournament of Roses” resists disease.

3 Disease controls

Our damp Northwest climate makes it tough to grow some varieties of plants that are prone to diseases. Fortunately, there are far more plants that are naturally resistant. You can find plenty of easy ways to prevent diseases such as black spot and powdery mildew without hazardous chemicals. When plant diseases appear despite prevention efforts, there are options available to handle them safely. If you decide to use a pesticide, the tables in this chapter will help you choose the safest products.

Prevent

Build healthy soil with compost and organic fertilizer. They will enrich your soil with nutrients, help hold water, loosen clay and feed beneficial soil life.

Choose disease-resistant plants. Opt for native plants, or select from the vast array of other plants adapted to wet-winter, dry-summer climates. Some plants – roses, for example – are quite susceptible to diseases such as black spot or powdery mildew, but varieties that fare better in this climate are available. Find a wide range of attractive, disease-resistant flowering plants at www.greatplantpicks.org.

Choose disease-resistant trees. Native trees generally resist disease, but a few succumb easily. For example, dogwoods can suffer from anthracnose leaf blight, and maples can get infected with verticillium wilt. These are very difficult to treat, so selecting a disease-resistant native or nonnative species or variety is the best option. Find resources to help you choose on page 65.

Give roses lots of sun and air. Plant roses where they will get six hours of sun daily. Leave space between plants, then prune in early spring to keep the middle of the plant open. This will dry the leaves and discourage most diseases. Remove leaves close to the ground.

Don't overfertilize with nitrogen. Most diseases will settle first on tender new growth stimulated by nitrogen fertilizer.

Space plants for good air circulation. Prune or thin annual plants in late summer if the foliage has become crowded.

Use a drip watering system, and water regularly but not too much. Drip irrigation and soaker hoses are the best choices. Sprinklers splash water and soil, which can spread plant diseases. Water regularly to prevent plant stress. Avoid overwatering, which can foster disease.

Mulch. Many diseases live in the soil. Mulch helps prevent the spread of disease spores. Just be sure to keep open a bare space a few inches around plant stems and crowns.

Rotate annual crops every year. If you have the space, you'll reduce the spread of soil-borne diseases by planting flowers and vegetables of a particular family in different areas from year to year. For example, switch tomatoes with cucumbers or petunias with zinnias.

Observe

Walk through your garden often. Pay special attention to plants – such as roses – that are prone to diseases. You will be more successful in managing diseases if you treat them as soon as you see symptoms.

Manage

Remove diseased leaves. Don't put them with your home compost – instead, get rid of diseased leaves in the bin for yard-waste pickup.

Use a baking soda fungicide for powdery mildew. Green Cure® fungicide is an example.

Sulfur or jojoba oil may be appropriate for specific diseases. Products that contain these ingredients are less toxic than those containing harsher chemicals.

Treat diseases and insects separately. Combination products are more hazardous than those that treat only one problem.

Learn

When trying a remedy, write down what you did and how well it worked. Was it more effective on some plants than others? Pay attention to weather and its impact on the spread of diseases.

Disease controls

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

Cultural, physical and mechanical methods.

LOWEST HAZARD

Plant-resistant varieties							
Avoid overhead watering							
Remove and destroy infected leaves and branches; sterilize pruners between cuts							
Plant in right sun location, provide good air circulation							
Compost tea applications may help prevent diseases							

Low-toxicity pesticide products exempt from the EPA registration process. All are considered low risk, but note cautions.

LOWEST HAZARD

Pharm Solutions Flower Pharm								cottonseed oil, rosemary oil, cinnamon oil
Organocide™ Organic Insecticide Fungicide								sesame oil
Dr. Earth® 3-Controls™ Organic Fungicide								clove oil
Organocide™ Organic Insecticide & Fungicide								sesame oil (fish oil, lecithin)

EPA-registered pesticide products

LOWEST HAZARD

Lilly Miller® Multi-Purpose Fungicide RTU	○	?	○	○	NA	○		sulfur
Monterey E-rase™ RTU Powdery Mildew Control	○	?	○	○	○	○		jojoba oil
Serenade® Garden Lawn Disease Control	○	?	○	○	○	○		Bacillus subtilis, strain QST 713
GreenCure® Fungicide	○	?	○	○	NA	?		potassium bicarbonate
Hi-Yield® Dusting Wettable Sulfur	○	?	○	○	NA	○		sulfur
Monterey E-rase™ Concentrate Powdery Mildew Control	○	?	○	○	○	○		jojoba oil

continued on next page

- Lowest hazard
- ⚠ Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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Disease controls

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 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

MODERATE HAZARD

	Short-term health hazard	Long-term health hazard	Hazard to aquatic life	Hazard to birds, bees or pets	Half-life in soil	Water pollution hazard	Active ingredients
Espoma® Earth-tone® 3 in 1 Disease Control RTU	○	●	○	○	○	○	sulfur, pyrethrins
Lilly Miller® Worry Free® 3 in 1 Garden Spray	○	●	○	○	○	○	sulfur, pyrethrins
Espoma® Earth-tone® 3 in 1 Disease Control Concentrate	○	●	○	○	○	○	sulfur, pyrethrins
Garden Safe® Brand Fungicide 3® RTU	○	?	○	●	○	○	neem oil
Green Light® Rose Defense™ RTU	○	?	○	●	○	○	neem oil (clarified hydrophobic extract of)
Safer® 3 in 1 Garden Spray 2 RTU	○	?	●	○	NA	○	potassium salts of fatty acids, sulfur
Concern® Copper Soap Fungicide	○	●	●	○	NA	○	copper octanoate
Lilly Miller® Cueva™ Copper Soap Fungicide	○	●	●	○	NA	○	copper octanoate
E.B. Stone™ Copper Soap Concentrate	○	●	●	○	NA	○	copper octanoate
Garden Safe® Brand Fungicide 3® Concentrate	○	?	●	●	○	○	neem oil
Green Light® Rose Defense™ Concentrate	○	?	●	●	○	○	neem oil (clarified hydrophobic extract of)
Hi-Yield® Bordeaux Mix Fungicide	○	●	●	○	NA	○	copper expressed as metallic copper
Lilly Miller® Kop-R-Spray™ Concentrate	○	●	●	○	NA	○	copper, metallic
Bayer Advanced™ Fungus Control for Lawns	○	●	○	○	○	●	triadimefon
Ferti-lome® Halt™ Systemic Rose, Flower, Lawn, Ornamental Fungicide	○	●	○	○	○	○	thiophanate methyl
Bonide® Garden Dust	○	●	●	○	○	○	copper sulfate, rotenone, other cube resins
Green Light® Rose Defense™ II RTU	○	●	○	●	●	○	neem oil, pyrethrins, piperonyl butoxide
Lilly Miller® Microcop® / Sta-Stuk "M"™	●	●	●	○	NA	○	copper sulfate

continued on next page

○ Lowest hazard

● Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

HIGHEST HAZARD

Bonide® Fung-onil™ Multipurpose Fungicide RTU	○	●	◐	○	◐	○	chlorothalonil
Garden Tech™ Daconil® Fungicide	○	●	◐	○	◐	○	chlorothalonil
Ferti-lome® F-Stop™	○	●	◐	○	◐	◐	myclobutanil
Spectracide® Immunox® Lawn Disease Control	○	●	◐	○	◐	◐	myclobutanil
Bayer Advanced™ Disease Control for Roses, Flowers, Shrubs	○	◐	◐	○	●	◐	tebuconazole
Spectracide® Immunox® Plus Insect & Disease Control	○	●	◐	○	◐	◐	myclobutanil, permethrin
Ortho® Rose Pride® Rose & Shrub Disease Control Concentrate	●	●	○	○	○	◐	triforine
Green Light® Fung-Away® Systemic Lawn Fungicide	○	●	◐	○	◐	◐	myclobutanil
Garden Tech™ Daconil® Fungicide Concentrate	◐	●	◐	○	◐	○	chlorothalonil
Bonide® Infuse Systemic Disease Control	◐	●	◐	○	◐	◐	propiconazole
Ferti-lome® Liquid Systemic Fungicide	◐	●	◐	○	◐	◐	propiconazole
Ortho® Lawn Disease Control	◐	●	◐	○	◐	◐	propiconazole
Monterey Fruit Tree & Vegetable Ornamental Fungicide	◐	●	◐	◐	◐	○	chlorothalonil
Ortho® MAX™ Garden Disease Control	◐	●	◐	◐	◐	○	chlorothalonil
Ortho® Orthenex® Insect & Disease Control Aerosol	◐	●	●	○	◐	◐	acephate, triforine, resmethrin
Bayer Advanced™ Dual Protection Azalea, Camellia & Rhododendron Insect & Disease Control	○	◐	●	○	●	●	tebuconazole, imidacloprid

○ Lowest hazard

◐ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Notes

3





Regular weeding helps your garden thrive.

4 Weed controls

You can reduce weeds with some simple methods, gaining more time to enjoy your garden. You can also manage weeds with little or no use of hazardous weed killers. If you decide to use a pesticide, the tables in this chapter will help you choose the safest products.

Prevent

Build healthy soil with compost and mulch. Good soil leads to healthy, vigorous plants that will crowd out weeds. In good soil, weeds are also easier to pull.

Grow a multilayered garden. If you grow a variety of plants in your garden beds, they will shade the weeds. Fewer weeds would sprout, and any that did would be less noticeable.

Grow a healthy lawn. The most important elements are enough sunlight and healthy soil. A thick, vigorous stand of turf will have fewer weeds than a thin, spotty lawn. Set your mower on a higher setting, and leave the clippings on the lawn as mulch to add nutrients and improve the soil. If your soil is clay, you may need to top-dress with a thin layer of compost that's free of weed seeds. Water deeply in summer – no more than an inch a week – to encourage deep roots. If your soil has poor drainage, help the lawn “breathe” with a core aeration, then overseed with a Northwest-appropriate grass seed every year or two. For more information about creating a great lawn without chemical fertilizers and pesticides, visit www.healthylawns.org.

Use mulch as a barrier in garden beds. A thick layer of mulch is your best defense against weeds. It keeps most weed seeds from germinating and blocks light from weed sprouts, killing off most of them. Organic mulch also provides nutrients for your plants. Add new layers every year or two as mulch breaks down. Keep a bare space a few inches around stems and crowns of plants to prevent diseases.

Use cardboard sheets or thick layers of newspaper. These barriers block out the light and create an easy way to establish new garden beds or keep weeds from pathways. Cover them with compost or arborist chips or stones for paths.

Mulch cautions

While most mulches are among the best strategies for preventing weeds, a few may pose hazards to people, pets or the environment.

Color-enhanced mulches may contain dyes with harmful ingredients that can leach into the soil.

Cocoa hull mulch smells like chocolate at first and improves soil as it breaks down, but it can be harmful or fatal to dogs if swallowed.

Landscape fabric and plastic film used on slopes can cause runoff into storm drains, rivers and streams.

Rubber mulch, if made with recycled tires, may leach toxic heavy metals.

Landscape fabric is not the best approach for garden beds. Weeds may not grow beneath the fabric, but they can eventually sprout in the mulch layer above. Roots then get tangled in the fabric. You'll likely tear it when you pull weeds, and more weeds will grow in the holes. Landscape fabric is more useful for pathways, especially in combination with stone mulch, which reduces the chance of weeds growing above the fabric.

Observe

Notice where weeds are sprouting. Weeds are easier to manage if you get them while they're small. If you have more weeds in some areas, perhaps the soil is bare or the lawn is thin. Covering bare soil with mulch and improving your lawn's health will greatly reduce your weeds.

Noxious weeds are highly invasive. They can escape yards and dominate local natural areas. The state and county publish lists and photos of noxious weeds. Keep track of these weeds, and pull them as soon as you see any. To learn more about invasive weeds, visit www.opb.org/programs/invasives.

Manage

Allow a few weeds in your lawn. A lawn can be more than just a sea of grass. Many so-called "weeds" such as clover or daisies improve the soil or add interest. Specially formulated Northwest seed mixes available from local nurseries feature a variety of grasses and small flowering plants that can be mowed.

Use heat to manage weeds. Simple boiling water will kill many young weeds. A teakettle is the safest bet for pouring scalding liquid. The flame weeder – essentially a blow torch on a wand – is available for less than \$100. Heat is especially useful on patios and paths. Avoid using flames in dry conditions and near flammable objects.

Remove weeds when they're young. Not only are small weeds easier to pull, getting them before they set seed stops many from reproducing all over your landscape.

Use weeding tools. Hand-held tools are safer than chemical herbicides. They are less likely to harm other plantings and won't poison you or run off into rivers and streams. Below are a few sturdy, well-designed tools to consider.

Some people use household vinegar to kill weeds. New products on the market based on acetic acid (included in vinegar), citric acid (found in lemons) or other acids likely work better than plain vinegar. They are stronger and contain a detergent or soap to make the product stick to plant leaves. Acid-based herbicides will kill or damage any plants they touch, including grass, and may be most useful for managing weeds in gravel and on patios and sidewalks. They break down quickly, causing less environmental harm than many other chemical herbicides. *Caution: These products contain a higher percentage of acid than plain vinegar and – if splashed in the eyes – may cause severe irritation or even damage.*

Helpful garden tools



hori-hori

Hori-hori. This multipurpose tool, also known as a Japanese garden knife, works for many weeding tasks and can get out the entire root. It can also be used for digging, transplanting, and cutting through tough roots. Many gardeners consider it their favorite tool.

Weed pullers. Weed pullers remove weeds with long taproots, such as dandelions, and work best in moist soil. There are several types of weed pullers: Some have pincers that grab the root and pop it out. Some have a V-shape. Others work with a twisting action. Most have long handles, so you don't need to bend over. To help prevent new dandelions after pulling out the old ones, fill the holes with a mixture of grass seed and a little soil.

Cultivator. A cultivator loosens soil and dislodges small weeds, working best when weeds are small. Use it several times each gardening season to remove newly sprouted weeds.



stirrup or hula hoe

Hoes. Hoes may work better than cultivators when weeds are larger, because they move horizontally, chopping weeds under the soil. Newer hoe designs are easier and more effective than the traditional garden hoe. Most have long handles, so you don't need to bend over. Popular hoes include the collinear, the stirrup, the scuffle and the delta hoe.

Chemical herbicides, including weed and feed, are pesticides. Runoff from pesticides may be toxic to fish and other living things. Use them as a last resort in solving a weed problem. To reduce runoff, don't apply if rain is expected. If you use more-hazardous chemical herbicides, spot-treat individual weeds instead of broadcasting over entire areas to reduce the risk of harm to people, pets, wildlife, groundwater and local rivers and streams. Be sure to choose the right type of herbicide for your problem. See sidebar for more information.

Learn

Evaluate how well your various weed strategies worked. A layer of mulch may have dramatically reduced weeds in your garden beds. A thicker lawn may have greatly decreased the number of dandelions. Perhaps you don't need to buy herbicides at all.

Types of chemical weed killers

Pre-emergent herbicides: These prevent weed seeds from growing and have little or no effect on existing weeds. The use of a pre-emergent chemical herbicide anticipates a problem that may not exist, so application may unnecessarily impact the environment. Barriers, mulches and corn gluten are examples of safer, nonchemical pre-emergent weed controls.

Post-emergent herbicides: These kill existing weeds. They are classified as selective and nonselective.

Selective post-emergent herbicides kill either broadleaf weeds or grasses, but generally not both. They are usually used to control weeds in lawns. They are the most environmentally hazardous of the chemical herbicides – highly mobile and most often toxic to aquatic organisms. Weed-and-feed products contain selective herbicides.

Nonselective post-emergent herbicides kill or damage plants, including grass, indiscriminately. Such herbicides are either "contact" herbicides, which destroy the plant tissues they touch, or "systemic" versions which are absorbed and circulated to kill the entire plant. The contact herbicides are typically acid- or oil-based and are the least toxic of the herbicides. Contact herbicides work well in controlling annual weeds. Systemic herbicides work well in controlling perennial weeds that re-sprout from roots. All the systemic herbicides are in the moderate to highly hazardous category. Roundup® (containing glyphosate) is the most common example.

PRE-EMERGENT Weed controls

These products are used *before* weeds appear. They have no effect on existing weeds.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

Cultural, physical and mechanical methods.

LOWEST HAZARD

Mulch								wood chips, compost, bark, coconut coir, and other natural products
Plants								thick planting shades ground and inhibits weed germination
Weeding tools								hoe, trowel, hori-hori, etc.
Propane torch								fire-safety practices important when flame-weeding

Low-toxicity pesticide products exempt from EPA registration process. All considered low risk, but note cautions.

LOWEST HAZARD

Bradfield Organics® Luscious Lawn Granulated Corn Gluten	○	○	○	○	?	?		corn gluten
Concern® Weed Prevention Plus®	○	○	○	○	?	?		corn gluten
Down to Earth Corn Weed Blocker	○	○	○	○	?	?		corn gluten
Espoma Organic® Weed Preventer Plus Lawn Food	○	○	○	○	?	?		corn gluten meal
Preen® Vegetable Garden Weed Preventer	○	○	○	○	?	?		corn gluten meal

EPA-registered pesticide products

MODERATE HAZARD

Green Light® Portrait® Broadleaf Weed Preventer	○	●	○	○	●	○		isoxaben
Monterey Weed Impede™	○	●	●	○	○	○		oryzalin
Turf King Pennington Lawn Fertilizer & Controls Crabgrass	○	●	○	○	●	○		prodiamine

EPA-registered pesticide products

HIGHEST HAZARD

Scotts® Halts® Crabgrass Preventer	○	●	●	○	●	○		pendimethalin
Scotts® Turf Builder® with Halts® Crabgrass Preventer	○	●	●	○	●	○		pendimethalin
Lilly Miller® Casoron® Granules	○	●	○	○	●	●		dichlobenil

continued on next page

○ Lowest hazard

● Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

□ Products and methods not EPA-regulated may pose risks to the user and/or the environment. Follow all instructions and cautions on labels.

Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

PRE-EMERGENT Weed controls

These products are used *before* weeds appear. They have no effect on existing weeds.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

EPA-registered pesticide products

HIGHEST HAZARD

Lilly Miller® Noxall® Vegetation Killer	○	⦿	○	○	⦿	⦿	dichlobenil
Scotts Lawn Pro 4-Step Program Step 1 for Seeding Starter Fertilizer with Crabgrass Preventer	○	?	⦿	○	⦿	⦿	siduron
Vigoro® Premium Mulch with Weed Stop®	○	○	●	○	●	○	dithiopyr
Schultz™ Supreme Green™ Crabgrass Preventer with Fertilizer	○	○	●	○	●	○	dithiopyr
Vigoro® Ultra Turf™ Crabgrass Preventer	○	○	●	○	●	○	dithiopyr
Green Light® Amaze® Grass & Weed Preventer 2	○	●	⦿	○	⦿	○	benefin, oryzalin
Preen® Garden Weed Preventer	○	⦿	●	○	⦿	○	trifluralin
Miracle Gro® Garden Weed Preventer & Plant Food®	○	⦿	●	○	⦿	○	trifluralin
Preen® Weed Preventer with Brilliant Blooms™ Fertilizer	○	⦿	●	○	⦿	○	trifluralin
Preen® Mulch Plus®	○	⦿	●	○	●	○	trifluralin, isoxaben

○ Lowest hazard

⦿ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

SELECTIVE, POST-EMERGENT Weed controls

These products are used on *existing* weeds. They kill either broadleaf weeds or grasses but generally not both.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

Cultural, physical and mechanical methods.

LOWEST HAZARD

Mulch							
Aerate and overseed lawns							
Hand tools							long-handled weed puller, trowel, hori-hori

EPA-registered pesticide products

MODERATE HAZARD

Scotts® Lawn Pro® Super Turf Builder® with PLUS 2® Weed Control	○	◐	◐	○	○	◐	2,4-D, mecoprop-P
Scotts® Turf Builder® WinterGuard With PLUS 2® Weed Control	○	◐	◐	○	○	◐	2,4-D, MCPP
Scotts® Turf Builder® with PLUS 2® Weed Control	○	◐	◐	○	○	◐	2,4-D, MCPP
Vigoro® Ultra Turf™ Phosphorus-Free Winterizer Weed & Feed 2	○	◐	◐	○	○	◐	2,4-D, mecoprop-P, dicamba

HIGHEST HAZARD

Ferti-lome Over-The-Top Grass Killer RTU	○	?	◐	○	○	●	fluazifop-P-butyl
Ortho® Grass-B-Gon® Garden Grass Killer	○	?	◐	○	○	●	fluazifop-P-butyl
Bayer Advanced™ Brush Killer Plus RTU	○	?	○	○	◐	●	triclopyr
Lilly Miller® Brush, Blackberry & Vine Brush Killer RTU	○	?	○	○	◐	●	triclopyr
Ortho® MAX® Poison Ivy & Tough Brush Killer RTU	○	?	○	○	◐	●	triclopyr
Bayer Advanced™ Brush Killer Plus Concentrate	○	?	○	○	◐	●	triclopyr
Green Light® Cut Vine & Stump Killer	○	?	○	○	◐	●	triclopyr
Lilly Miller® Blackberry & Brush Killer	○	?	○	○	◐	●	triclopyr TEA salt
Ortho® MAX® Poison Ivy & Tough Brush Concentrate	○	?	○	○	◐	●	triclopyr
Ortho® Weed-B-Gon® Chickweed, Clover and Oxalis Killer for Lawns	○	?	○	○	◐	●	triclopyr
ACE® Spot Weed Killer 2	○	◐	◐	○	○	●	2,4-D, MCPP, dicamba
Bonide® Poison Ivy & Brush Killer BK-32 RTU	○	◐	○	○	◐	●	MCPA, triclopyr, dicamba

EPA-registered pesticide products

continued on next page

○ Lowest hazard

◐ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

SELECTIVE, POST-EMERGENT Weed controls

These products are used on *existing* weeds. They kill either broadleaf weeds or grasses but generally not both.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

HIGHEST HAZARD

Bonide® Weed Beater Lawn Spot Weeder RTU	○	⦿	⦿	○	○	●	2,4-D, mecoprop, dicamba
Ortho® Total Kill Brand Lawn Weed Killer RTU	○	●	⦿	○	○	⦿	2,4-D, dichlorprop, MCPP
Ortho® Weed-B-Gone Crabgrass Killer for Lawns RTU	○	●	○	○	●	○	MSMA
Ortho® Weed-B-Gon® MAX® Weed Killer for Lawns RTU	○	⦿	⦿	○	○	●	2,4-D, MCPP, dicamba
Spectracide® Weed Stop® 2X Weed Killer for Lawns RTU	○	⦿	⦿	○	○	●	2,4-D, MCPA, dicamba, sulfentrazone
WeedEx® Dandelion Stick® RTU	○	⦿	○	○	⦿	●	2,4-D, triclopyr
Ferti-lome® Crabgrass, Nutgrass & Dallisgrass Killer	○	●	○	○	●	○	monosodium acid methanearsonate
Ortho® Total Kill Brand Lawn Weed Killer Concentrate	⦿	⦿	⦿	○	○	⦿	2,4-D, MCPP, dichlorprop
Ortho® Weed-B-Gon® Crabgrass Killer for Lawns Concentrate	○	●	○	○	●	○	MSMA
Spectracide® Weed Stop® 2X Weed Killer for Lawns Concentrate	○	⦿	⦿	○	○	●	2,4-D, MCPA, dicamba, sulfentrazone
ACE® Green Turf Weed & Feed	○	⦿	⦿	○	○	●	2,4-D, MCPP, dicamba
Lilly Miller® Hose 'n Go Weed & Feed	○	⦿	⦿	○	○	●	2,4-D, MCPA, dicamba
Lilly Miller® Ultragreen® Weed & Feed	○	⦿	⦿	○	○	●	2,4-D, MCPA, dicamba
Lilly Miller® Ultragreen® Pro Weed & Feed	○	⦿	⦿	○	○	●	2,4-D, MCPA, dicamba
Scotts® Liquid Turf Builder® with PLUS 2® Weed Control 25-1-2 Lawn Fertilizer and Broadleaf Weed Control	○	●	⦿	○	○	⦿	2,4-D, mecoprop, dichlorprop
Sta-Green® Phosphorus-free Weed & Feed	○	⦿	⦿	○	○	●	2,4-D, MCPP, dicamba
Vigoro® Ultra Turf™ Weed & Feed	○	⦿	⦿	○	○	●	2,4-D, MCPP, dicamba
Vigoro Ultra Turf Weed & Feed RTS	○	●	⦿	○	○	⦿	2,4-D, MCPP, dichlorprop-P
Bonide® Weed Beater ULTRA RTS	○	⦿	○	○	●	●	MCPA, MCPP, dicamba, carfentrazone-ethyl
Eliminator® Dandelion & Clover Killer RTU	○	●	⦿	○	○	●	2,4-D, MCPP, dichlorprop-P

EPA-registered pesticide products

continued on next page

- Lowest hazard
- ⦿ Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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SELECTIVE, POST-EMERGENT Weed controls

These products are used on *existing* weeds. They kill either broadleaf weeds or grasses but generally not both.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

HIGHEST HAZARD							
Ferti-lome® Weed-Free Zone RTU	○	●	○	○	●	●	MCPA, MCPP, dicamba, carfentrazone-ethyl
Ortho® Weed-B-Gon® MAX™ plus Crabgrass Killer for Lawns RTU	○	●	○	○	●	●	2,4-D, quinclorac, dicamba
Bonide® Weed Beater ULTRA Concentrate	○	●	○	○	●	●	MCPA, MCPP, dicamba, carfentrazone-ethyl
Crossbow® Low Volatile Weed & Brush Herbicide	○	●	●	○	●	●	2,4-D, triclopyr
Ortho® Weed-B-Gon® MAX® Weed Killer For Lawns Concentrate	●	●	○	○	●	●	MCPA, triclopyr amine, dicamba
Preen® Lawn STEPSAVER Weed Control plus Fertilizer	○	●	○	○	●	●	2,4-D, MCPP, dicamba, dithiopyr
Ortho® Weed-B-Gon MAX® Plus Crabgrass Control for Lawns RTU	○	●	●	○	●	●	quinclorac, MCPP, 2,4-D, dicamba
Spectracide® Weed Stop® for Lawns plus Crabgrass Killer RTU	○	●	●	○	●	●	2,4-D, quinclorac, dicamba, sulfentrazone
Bayer Advanced™ All-In-One Lawn Weed & Crabgrass Killer RTS	○	●	●	○	●	●	2,4-D, quinclorac, dicamba
Ortho® Weed-B-Gon® MAX® Plus Crabgrass Killer for Lawns RTS	○	●	●	○	●	●	2,4-D, quinclorac, dicamba
Spectracide® Weed Stop® for Lawns Concentrate plus Crabgrass Killer	○	●	●	○	●	●	2,4-D, quinclorac, dicamba, sulfentrazone
Bayer Advanced™ All-In-One Lawn Weed & Crabgrass Killer RTU	○	●	●	○	●	●	MSMA, 2,4-D, MCPP, dicamba
Bayer Advanced™ All-In-One Lawn Weed & Crabgrass Killer Concentrate	○	●	●	○	●	●	MSMA, 2,4-D, MCPP, dicamba

continued on next page

- Lowest hazard
- Moderate hazard
- Highest hazard

NA Not applicable
? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

NONSELECTIVE, POST-EMERGENT Weed controls

These products are used on *existing* weeds. They will kill or damage all plants, including lawn.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

Cultural, physical and mechanical methods

LOWEST HAZARD

Mulch								wood chips, compost, bark, coconut coir, and other natural products
Plants								thick planting shades ground and inhibits weed germination
Weeding tools								hoe, trowel, hori-hori, etc.
Propane torch								fire-safety practices important when flame-weeding

Low-toxicity pesticide products exempt from EPA registration process. All considered low risk, but note cautions.

LOWEST HAZARD

Perfectly Natural™ Weed 'n Grass Killer								citric acid, clove oil
St. Gabriel Laboratories BurnOut II Weed & Grass Killer RTU								citric acid, clove oil
St. Gabriel Laboratories BurnOut II Weed & Grass Killer Concentrate								citric acid, clove oil

EPA-registered pesticide products

LOWEST HAZARD

Concern® Fast-Acting Weed Killer®	○	?	○	○	○	?	ammoniated salts of fatty acids
Garden Safe Brand Weed & Grass Killer	○	?	○	○	○	?	ammoniated salts of fatty acids
Safer® Fast Acting Weed & Grass Killer RTU	○	?	?	?	○	○	potassium salts of fatty acids
Lilly Miller® Worry Free® Weed & Grass Killer for Organic Gardening RTU	○	?	○	○	○	○	d-Limonene (citrus oil)
Lilly Miller® Worry Free® Weed & Grass Killer for Organic Gardening Concentrate	○	?	○	○	○	○	d-Limonene (citrus oil)
Nature's Avenger® Organic Herbicide Concentrate Weed Controller	○	?	○	○	○	○	d-Limonene

continued on next page

- Lowest hazard
- ⚠ Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

NONSELECTIVE, POST-EMERGENT Weed controls

These products are used on *existing* weeds. They will kill or damage all plants, including lawn.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

EPA-registered pesticide products

MODERATE HAZARD

Eliminator® Weed & Grass Killer II RTU	○	?	○	○	●	○	glyphosate isopropylamine salt
Roundup® Weed & Grass Killer RTU Plus	○	?	○	○	●	○	glyphosate, pelargonic acid
Roundup® Weed & Grass Killer Super Concentrate	○	?	○	○	●	○	glyphosate
Nature's Glory™ Weed & Grass Killer	●	?	○	○	○	?	acetic acid
Ortho® Season-Long® Grass & Weed Killer RTU	○	●	○	○	●	○	oxyfluorfen, glyphosate
Espoma® Earth-tone® 4 in 1 Weed Control	○	?	●	○	○	●	ammoniated soap of fatty acids, maleic hydrazide
Ortho® Total Kill Brand Weed & Grass Killer Super Concentrate	●	?	○	○	●	○	glyphosate

HIGHEST HAZARD

Espoma® Earth-tone® 4 in 1 Weed Control Concentrate	●	?	●	○	○	●	ammoniated soap of fatty acids, maleic hydrazide
Roundup® Extended Control® Weed & Grass Killer Plus Weed Preventer Concentrate	○	?	●	○	●	○	glyphosate, diquat dibromide, imazapic ammonium
Ortho® Season-Long® Max Weed & Grass Killer Plus Preventer Concentrate	○	●	●	○	●	○	oxyfluorfen, diquat dibromide, glyphosate isopropamine salt
Roundup® Extended Control® Weed & Grass Killer Plus Weed Preventer 2 RTU	○	?	○	○	●	●	glyphosate, pelargonic acid, imazapic ammonium salt
Roundup® Extended Control® Weed & Grass Killer Plus Weed Preventer RTU	○	?	○	○	●	●	glyphosate, imazapic ammonium salt
Ortho® GroundClear® Complete Vegetation Killer RTU	○	?	○	○	●	●	imazapyr, glyphosate
Roundup® Poison Ivy Plus Tough Brush Killer RTU	○	?	○	○	●	●	triclopyr TEA salt, glyphosate
Roundup® Poison Ivy & Tough Brush Killer Plus Concentrate	○	?	○	○	●	●	triclopyr TEA salt, glyphosate
Roundup® Weed & Grass Killer Concentrate Plus	○	?	●	○	●	○	diquat dibromide, glyphosate

continued on next page

○ Lowest hazard

● Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

NONSELECTIVE, POST-EMERGENT Weed controls

These products are used on *existing* weeds. They will kill or damage all plants, including lawn.

Short-term health hazard
Long-term health hazard
Hazard to aquatic life
Hazard to birds, bees or pets
Half-life in soil
Water pollution hazard

Active ingredients

EPA-registered pesticide products

HIGHEST HAZARD

Spectracide® Weed & Grass Killer RTU	○	?	●	○	●	●	diquat dibromide, fluazifop-P-butyl, dicamba
Spectracide® Triple Strike Grass Weed Root Killer2 Concentrate	○	?	●	○	●	●	diquat dibromide, fluazifop-P-butyl, dicamba
Ortho® Ground Clear® Complete Vegetation Killer Concentrate	●	?	○	○	●	●	imazapyr, glyphosate
Ortho® Total Kill Brand Vegetation Killer Concentrate	●	?	●	○	●	●	prometon

○ Lowest hazard

● Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower on the table are more hazardous. Differences between close-ranking products may not be significant.



Moss thrives in the Pacific Northwest.

5 Moss controls

Our rainy Northwest winters are ideal for growing moss. As a native plant, it is low-maintenance and supports wildlife. Visit a Japanese garden to see moss in action as a beautiful groundcover. Some people, however, consider moss a weed and want it removed. Moss can make paths slippery and unsafe and can damage roofs and other structures. There are many options for safely preventing and managing moss. The best way to prevent moss is to provide more sunlight. If you decide to use a pesticide, the tables in this chapter will help you choose the safest products.

Prevent

Give your lawn more sun and less water. Moss grows best where it is damp and shady, and it prefers acidic soil. Grass grows best in sunny, drier conditions and more alkaline soil. For healthier grass and less moss, prune some branches in your trees to let in more sunlight. Correct drainage problems so the lawn won't stay damp, but be sure not to interfere with your septic drain field. Add lime to make the soil less acidic.

Replace a shaded lawn with other plantings. You can avoid the struggle of growing a lawn on the north side of your house or under large evergreens. A garden bed of shade-loving native plants can be an easy-care substitute that will enhance your yard.

Prune back branches to reduce moss on roofs. Moss may accumulate heavily on shaded areas of the roof. Pruning will let in more light and slow the buildup.

Clean paths and structures regularly. Sweeping and washing roofs, paths and fences before moss appears can prevent it from growing. Dirt and leaves on these surfaces provide a growing medium and cast shade – both of which encourage moss.

Observe

See where and when moss grows thickest. These are areas that may need more light and less water. A lawn area that stays wet is especially vulnerable.

Manage

Rake out the moss in the lawn. A thatch rake works better than a regular iron rake. After raking, reseed the bare spots so new grass will out-compete the moss. It's also helpful to aerate and use an organic or a slow-release fertilizer when you reseed. A thick, healthy lawn will have less moss.

Use hand or power tools to remove moss from sidewalks, decks and pavement.

When moss is dried out in the summer, it's easiest to remove. Use a shovel, hoe, scraper or heavy wire brush. Power washing is also an option.

Carefully use hand tools, not power washing, to remove moss from roofs. Power washing can damage shingles or get water under them. A leaf blower or gentle sweeping can be helpful. You may want to hire someone to remove the moss for you. It is easier to do in summer and on a regular basis. Don't wait for a thick coat of moss to build up.

Use a less-toxic moss control product. Look for products containing soaps, fatty acids or ferrous sulfate.

Take care to prevent runoff. Don't allow moss control products or contaminated rinse water to run off into a storm drain or into the street.

Learn

Keep an eye on the results of your management techniques. Determine the best time of the season to address moss in your lawn or on your roof. Evaluate your pruning results or drainage changes. Make adjustments.

Moss controls for lawns

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

Cultural, physical and mechanical methods

LOWEST HAZARD

Reduce shade and correct drainage problems							
Correct acidity problems							lime, after soil testing
Correct fertility problems							fertilizer (NOT weed and feed) after soil testing
Do not have lawn where moss grows							

EPA-registered pesticide products

LOWEST HAZARD

Scotts® Moss Control Granules for Lawns	○	○	○	○	NA	○	ferrous sulfate monohydrate
Vigoro® Ultra Turf™ Moss-Ex® Lawn Granules	○	○	○	○	NA	○	ferrous sulfate monohydrate
NuLife Rid-Moss®	○	○	○	○	NA	○	ferrous sulfate monohydrate
TurfKing™ Lawn Moss Control	○	○	○	○	NA	○	ferrous sulfate monohydrate
Scotts® Turf Builder® with Moss Control	○	○	○	○	NA	○	ferrous sulfate
Lilly Miller® Moss Out!™ Plus Fertilizer	○	○	○	○	NA	○	ferrous sulfate monohydrate
TurfKing™ Lawn Fertilizer & Moss Control	○	○	○	○	NA	○	ferrous sulfate monohydrate

MODERATE HAZARD

Lilly Miller® Moss Out!™ Spot Treater RTU	●	○	◐	○	NA	○	ferric sulfate, anhydrous
Lilly Miller® Moss Out!™ For Lawns Concentrate	●	○	◐	○	NA	○	ferric sulfate

continued on next page

- Lowest hazard
- ◐ Moderate hazard
- Highest hazard

NA Not applicable
 ? Not enough data

Products and methods not EPA-regulated may pose risks to the user and/or the environment. Follow all instructions and cautions on labels.

Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Moss controls for structures

Spot application of a pesticide is almost always safer than broadcast application of the same product or a similar one.

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

Cultural, physical and capture methods, including traps and pheromone attractants

LOWEST HAZARD

Reduce shade and correct drainage problems

Hand tools, blower, pressure washer

Low-toxicity pesticide products exempt from EPA registration process. All considered good, but note cautions.

LOWEST HAZARD

Lilly Miller® Worry Free® Moss & Algae Control

sodium lauryl sulfate, citric acid

Lilly Miller® Moss Out!™ Roof Strips

zinc metal strips

Perfectly Natural™ Moss Killer

clove oil, citric acid

EPA-registered pesticide products

LOWEST HAZARD

Lilly Miller® Moss Out!™ For Roofs & Structures

○ ? ○ ○ ○ ○

ammoniated salts of fatty acids

Safer® Moss & Algae Killer & Surface Cleaner RTU

○ ? ○ ○ ○ ○

potassium salts of fatty acids

MODERATE HAZARD

Bayer Advanced™ 2-in-1 Moss & Algae Killer

● ? ○ ○ ○ ○

potassium salts of fatty acids

Garden Safe Brand Moss & Algae Killer

● ? ○ ○ ○ ○

potassium soap of fatty acids

Lilly Miller® Moss Out!™ For Roofs & Walks

⚠ ? ○ ○ ○ ○

ammoniated salts of fatty acids

Monterey Herbicidal Soap Kills Moss, Algae & Weeds

⚠ ? ○ ○ ○ ○

ammoniated salts of fatty acids

HIGHEST HAZARD

Lilly Miller® Moss Out!™ For Roofs Concentrate

● ● ⚠ ○ NA ○

zinc chloride

Corry's® Moss-B-Ware®

● ● ⚠ ○ NA ○

zinc sulfate monohydrate

○ Lowest hazard

⚠ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.



Moles, nature's rototiller.

6 Animal pest controls

There are many ways to keep unwanted animals out of your yard and prevent them from causing damage. Fences, traps, screens, baits and chemical repellents are some examples, but their effectiveness is mixed. This chapter includes tips on successfully managing some common animal pests and tables for choosing the least-toxic products and methods.

Moles

Moles eat pest insects, and their digging can help the soil. However, these burrowing animals – especially active in warm weather and after a rain – leave ridges and mounds in lawns and can damage garden plants. They rarely eat flower bulbs, ornamentals or other vegetative material, but plants may be physically disturbed by their tunneling. Moles are tough to manage, so you will need to use several different methods.

Prevent

There are no effective means to prevent moles in your lawn. Hardware cloth baskets set into the ground and surrounding a young plant's roots can be effective in protecting plants, trees and shrubs. Established trees and shrubs are generally safe from physical disruption.

Manage

Identify the pest. Because these pests are rarely seen, base your identification on the signs they leave behind. Moles excavate two types of tunnels: shallow feeding tunnels and deeper tunnels that network these feeding tunnels. It's the volcanolike mounds from these deeper tunnels that identify the mole's work.

Consider reducing your lawn. Replacing part of your lawn with garden beds attracts birds and butterflies and reduces visible mole damage.

Rake down the mole hills. The mounds are prime top-dressing delivered right to your site – free of charge. Pay attention to where the mounds pop up; you’re likely to see the moles moving to your neighbors’ yards after a few weeks.

Traps are the most effective mole control. It’s tough to trap a mole correctly, and traps can be dangerous, so get and follow detailed instructions. Mole control is allowed in Washington with restrictions. For information, visit <http://wdfw.wa.gov/wlm/living/moles.htm>.

Other approaches have limited success. Castor-oil repellents may help in the short term. Commercial products containing castor oil are available (see table), and you can also find recipes for homemade castor-oil repellents. Poisons and devices that make noise may not be effective. Also, flooding and fumigating rarely work.

Don’t use a pesticide that kills grubs or earthworms. This does not work to manage moles, and in the process you will kill earthworms that help your soil.

Voles

Voles are scavengers with a primarily vegetarian diet. Like moles, they live in underground burrows, and their tunnels are usually just beneath the surface, under grass or ground covers. They often use the tunnels built by moles. Much of the damage attributed to moles may be the voles’ work. They eat grasses, herbaceous plants, bulbs, seeds, flowers, leaves, roots of shrubs and small trees, bark, tubers and sometimes insects.

Prevent

Identify the pest. Voles are brown, reach about 6 inches in length at maturity and have a long ratlike tail. They live in burrows and leave tunnel openings on lawns, in the open garden, on fields and around emerging plants.

Remove shelter. Voles like places to hide from predators. If you reduce their shelter, you can reduce their numbers. Remove weeds and dense vegetation. Mow or till grassy areas and fields near your garden.

Fence them out. Protect young trees and ornamentals by placing a cylinder made from hardware cloth, sheet metal or heavy plastic around the trunk. Surround small plants with cylinders made by cutting the tops and bottoms from plastic soda bottles, tin cans or milk cartons.

Manage

Use repellents. Chemical and natural repellents may initially seem effective against voles, but they need to be reapplied frequently, and voles become accustomed to the smell. Success is measured in the reduction – not total elimination – of damage.

Use traps or baits. Ordinary mouse traps may be effective if voles are in a small area or if their numbers are small. With large numbers, you may need to resort to baits. Poison baits are potentially hazardous to other wildlife, children and pets. If you place the poison bait directly into burrow openings, the hazard is reduced. They are safest if used in bait stations.

Rats and house mice

Rats and mice cause the most problems when they find a way into your home. They are a concern because they may carry diseases. Rats also may damage structures.

Prevent

Seal openings. Any hole larger than a quarter inch should be closed using materials that rodents cannot chew through. Examples are quarter-inch hardware cloth, concrete, sheet metal, brick or mortar. Check for cracks or openings around the foundation, attic, vents and places where pipes or cables enter the building.

Remove food and nesting materials. Keep food, including pet food and bird seed, in rodent-proof containers. Put secure covers on garbage cans. Cover or remove loose insulation. Don't stack firewood or other materials against the house or directly on the ground. Clean up animal droppings.

Manage

Trap them. Trapping is the safest and most effective method. Use snap traps in secluded areas. Place them in usual travel ways, such as along walls.

Be careful with baits. While they can be effective in managing rats and mice, baits may also poison pets, so they are safest if used in bait stations. Rodents may die in areas that are hard to reach, such as within walls, which creates an odor problem.

Deer

Deer will eat garden plants. They also can damage trees and shrubs by rubbing against them and chewing on branches.

Prevent

Fence them out. The most effective deer control is a tall fence, at least 7 feet high, around the garden or yard. Individual plants can be protected using strong wire-mesh cylinders at least 5 feet high.

Manage

Use plants that deer don't like to eat. Reduce damage to the garden by using deer-resistant plants for ornamental plantings. The *Sunset Western Garden Book* has useful lists. Also ask your local nursery. Deer plant preferences may vary by area and over time, so be prepared to experiment.

Repellents and noisemakers don't work. A wide variety of products are sold to repel or frighten deer, but become ineffective once the deer get used to them.

Birds

Songbirds are lovely to have in your yard, and many birds help control pest insects. On the other hand, some birds may eat ripening fruit or vegetables.

Prevent

Use bird netting. When vulnerable fruit and vegetable crops are ripening, drape netting over trees and bushes. Be sure it reaches the ground or is gathered around the trunk.

Use nesting or roosting barriers. Angled barriers, screens and wire barriers make it uncomfortable for birds to nest or roost on ledges and building peaks.

Manage

Scare them. Birds are skittish. You can scare them off with a little noise. Try aluminum pans, wind chimes or devices that broadcast alarm calls. Hanging flashers, flags and balloons can work. It's best to move them about, so birds don't become used to them.

Trapping can be used against nonprotected birds only. Cage traps for house sparrows, domestic pigeons and starlings can be useful for reducing numbers.

A repellent may work. Methyl anthranilate, a product derived from grape skins, is registered for home use on a variety of crops.

Observe and learn

Critters are smart and not easily outwitted. For all of these pests, determine how well one method works before you try another. You may have to use several different control methods. Success may be determined by many factors. Find out more about managing these pests using the resources listed below.

Resources

University of California Davis

Guidelines for managing various home and garden pests: www.ipm.ucdavis.edu/PMG/menu/homegarden.html

Washington Department of Fish and Wildlife

"Living with Wildlife" Fact sheets on managing conflicts with wild pests: <http://wdfw.wa.gov/wlm/living/>

Washington State University Extension, Snohomish County

Facts on vertebrate pest management: <http://snohomish.wsu.edu/garden/vertchap.htm>

Animal pest controls

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

Cultural, physical and capture methods, including traps and pheromone attractants

LOWEST HAZARD

Bird-B-Gone Clear Plastic Bird Spikes									
Cinch Mole Trap (not legal in Washington)									
Contech Scarecrow® Outdoor Animal Deterrent Hose Attachment									
Exhart Mole Mover™									
Havahart® Live Animal Traps – All Sizes									
Snap-type Mouse and Rat Traps									
Glue-type Mouse and Rat Traps									glue
Sweeney's® Mole & Gopher Sonic Spike									electricity
Tomcat® Glue Traps with Eugenol									glue
Tomcat® Mouse Trap Kit: No-touch Trap with Attractant									attractant
Owl Decoy/Scarecrow									
Reflective Bird Tape									
Snake Scarecrow									

Low-toxicity pesticide products exempt from EPA registration process. All considered low risk, but note cautions.

LOWEST HAZARD

BioDefend™ Deer & Rabbit Repellent with Extendex™									putrescent whole egg solids, sodium laurel sulfate
Bonide® Mole Max® Mole and Vole Repellent									castor oil (USP grade)
Bonide® Shot-Gun® Repels All® Animal Repellent									dried blood, putrescent egg solids, garlic oil
Dr. T's Mole Out Mole Repelling Granules									castor oil (USP grade)
Lilly Miller® Worry Free® Outdoor Dog, Cat & Bird Repellent Granules									white pepper, thyme oil, peppermint oil
Messina Wildlife Deer Stopper									putrescent egg solids, rosemary oil, mint oil
Messina Wildlife Mole & Vole Stopper									castor oil, rosemary oil, mint oil, sodium laurel sulfate
Natural Pest Solutions Deer Solution									cinnamon oil

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- Lowest hazard
- ◐ Moderate hazard
- Highest hazard

- NA** Not applicable
- ?** Not enough data

 Products and methods not EPA-regulated may pose risks to the user and/or the environment. Follow all instructions and cautions on labels.

Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Animal pest controls

Short-term health hazard

Long-term health hazard

Hazard to aquatic life

Hazard to birds, bees or pets

Half-life in soil

Water pollution hazard

Active ingredients

Low-toxicity pesticide products exempt from EPA registration process. All considered low risk, but note cautions.

LOWEST HAZARD

Shake Away™ Deer Repellent – Coyote Urine Powder Packs								coyote urine, garlic oil
Shake Away™ Rodent Repellent								garlic oil, calcium carbonate, urea, water
Sweeney's® Mole & Gopher Repellent								castor oil
Grants Sure Stop® Mole Repellent								castor oil, soybean oil
Havahart® Get-Away® Mole Repellent								castor oil (U.S.P. grade)
Lilly Miller® Mole Repellent								castor oil (U.S.P. grade)
Liquid Fence Deer & Rabbit Repellent								putrescent whole egg solids, garlic, sodium laurel sulfate
Plantskydd® Deer-Rabbits-Elk Repellent								dried blood
Scoot® Products Mole Repellent								castor oil, garlic oil

EPA-registered pesticide products

LOWEST HAZARD

Havahart® Deer Off® Deer, Rabbit and Squirrel Repellent	○	?	○	○	○	?	putrescent egg solids, capsaicin, garlic
Scoot® Products Deer & Rabbit Repellent	○	?	○	○	○	?	capsaicin & capsaicinoid product, butyl mercaptan
Scoot® Products Squirrel Repellent	○	○	?	○	?	?	capsaicin & capsaicinoid product
Monterey No Goose Zone™	○	?	○	○	?	?	methyl anthranilate
Sweeney's® Mole & Gopher Repellent	○	○	?	○	?	?	castor oil

continued on next page

○ Lowest hazard

◐ Moderate hazard

● Highest hazard

NA Not applicable

? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Animal pest controls

Short-term health hazard
 Long-term health hazard
 Hazard to aquatic life
 Hazard to birds, bees or pets
 Half-life in soil
 Water pollution hazard

Active ingredients

EPA-registered pesticide products

MODERATE HAZARD

Bird X Goose Chase® Bird Repellent	🟡	?	○	○	?	?	methyl anthranilate
Tanglefoot® Bird Repellent	🟡	?	○	🟡	?	?	polybutene

HIGHEST HAZARD

Bonide® Moletox II® Mole & Gopher Killer	○	?	🟡	●	○	?	zinc phosphide
Grants Sure Stop® Mole & Gopher Bait	○	?	🟡	●	○	?	zinc phosphide
Nott® Mole-Nots	○	?	🟡	●	○	?	zinc phosphide
Grants Sure-Stop® Mole & Gopher Bait	○	?	🟡	●	○	?	zinc phosphide
Sweeney's® Poison Peanuts	○	?	🟡	●	○	?	zinc phosphide
JT Eaton™ AC Formula 90™ Rodenticide	○	?	🟡	●	○	○	chlorophacinone
Tomcat® Ultra Pre-filled Bait Trays	○	?	🟡	●	○	○	bromadiolone
Tomcat® Ultra Pelleted Mouse & Rat Bait	○	?	🟡	●	○	○	bromadiolone
Victor® Mouse Bait Packs	○	?	🟡	●	○	○	bromadiolone
Victor® Rat & Mouse Place Packs	○	?	🟡	●	○	○	bromadiolone
d-Con® Rat & Mouse Bait Blocks Mini-Blocks	○	?	🟡	●	?	○	difethialone
Sweeney's® No Mess Paste Bait	○	?	🟡	●	?	○	difethialone
Bonide® Moletox® Baited Gel	○	●	○	●	?	○	warfarin
d-Con® Bait Pellets Kills Rats & Mice	○	?	🟡	●	●	○	brodifacoum
d-Con® Ready Mixed Bait Bits Kills Mice & Rats	○	?	🟡	●	●	?	brodifacoum
Kaput® Mole Gel Bait	○	●	🟡	●	?	○	warfarin
Atlas Chemical Corp. Giant Destroyer	🟡	?	○	●	?	?	sodium nitrate, sulfur, charcoal
Revenge® Rodent Smoke Bomb	🟡	?	○	●	?	?	sulfur, potassium nitrate, charcoal

- Lowest hazard
- 🟡 Moderate hazard
- Highest hazard

- NA Not applicable
- ? Not enough data

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Note: Products lower in the table are more hazardous. Differences between close-ranking products may not be significant.

Notes

6



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A pitchfork glides easily through nutrient-rich compost.

7 Fertilizers and soil amendments

Fertile soil is the key to healthy plants – and easier gardening. If you build healthy soil with compost and mulch, most plants will look great and protect themselves from many pests and diseases. The result will be less work for you and less money wasted on fertilizers and pesticides. This chapter includes expert tips for enhancing soil fertility, plus tables that show which fertilizers are less likely to end up polluting local rivers, streams and groundwater.

Understanding and creating healthy soil

Fertile soil is dark and crumbly and has a rich, earthy smell. It absorbs water like a sponge, breathes air like a lung and is teeming with life. A handful contains about 10 billion living organisms – far outnumbering the planet’s human population!

Tiny creatures make your soil fertile by:

- improving soil structure and drainage
- loosening clay soils
- generating free fertilizers from dead plant parts, rocks and air
- helping sandy soils retain water
- storing water for plants
- protecting plants from pests and diseases
- reducing erosion and runoff.

If your plants look healthy, your soil is likely fertile. If plants are growing too fast or slow, looking droopy or yellow or getting eaten by bugs, a soil imbalance may be the cause. The look and feel of soil also offers many clues. A light color and a hard or sticky feel may suggest a lack of organic matter or problems with compaction and drainage. If you have questions about your soil’s fertility, a soil analysis is a good way to find answers (see sidebar).

Avoid soil compaction. One of the best ways to help your soil is to ensure it does not get compacted. Anything you can do to prevent foot traffic or heavy equipment will help preserve your soil's drainage and ease of cultivation. To improve compacted soil, work in organic amendments such as compost or mineral amendments such as quarter-ten crushed rock. Creating mounded or raised beds with walking paths in between and minimizing tillage (especially when the soil is wet) can help considerably.

Micronutrient fertilizers and soil amendments can be very useful. Fertilizers containing the major plant nutrients (nitrogen, phosphorus and potassium) often get the most attention, but the lesser-known secondary nutrients (calcium, magnesium and sulfur) and micronutrients (boron, copper, iron, chloride, manganese, molybdenum and zinc) are just as essential to plant health.

Amendments often can unlock a soil's fertility better than any fertilizer. Compost and organic mulches are among the best soil conditioners for a garden. They feed beneficial creatures that keep soil fertile. You can dig compost into the soil or use it on the surface as mulch. Other great organic mulches include arborist chips and autumn leaves.

Soil tests can help you choose

A soil test can help you make good decisions about what your soil may need. Test for nutrient levels, pH, and organic matter content. Soil biology can also be analyzed by specialized labs. In the city, you may want to test for lead.

Nutrient levels. Tests can help you determine whether your soil is deficient in any of the 13 essential plant nutrients.

pH. Most plants thrive between pH values 5 and 8. In the rainy Pacific Northwest, soils tend to be acid (below pH 7) rather than alkaline (above pH 7). A test will point out your soil's pH.

Organic matter content. Worms, insects and other tiny organisms that fertilize your plants and keep them healthy feed on your soil's organic matter. A level of at least 5 percent is ideal for most garden plants.

Biology. Some labs can analyze your soil for the presence or absence of a wide array of beneficial soil organisms and suggest ways to enhance the populations of those that will help your garden plants thrive. Visit www.soilfoodweb.com for more information.

Lead. Urban soils sometimes contain harmful levels of lead and other heavy metals. Get your soil tested if your garden is near a road or an old painted building, especially if you have young children.

How to get a soil test. Some very basic tests for major nutrients and pH can be purchased for home use, but a laboratory analysis is generally more reliable. Contact your local cooperative extension service to find a soil testing lab. (See "Resources" on page 65). The lab will provide instructions on how to collect samples and interpret the results.

Soil amendments

Below is a list of materials used to enhance the soil's physical or chemical properties or to provide potassium, secondary nutrients or micronutrients. See descriptions for use recommendations or concerns. Additionally, products made from natural materials and listed in the other fertilizer tables in this chapter may serve similar functions.

Alfalfa meal	Great all-purpose fertilizer and amendment with 2 percent to 3 percent nitrogen and a range of other nutrients; pelleted form is less dusty.
Azomite®	Provides a broad array of trace minerals.
Blood meal	With about 12 percent nitrogen, this should be used carefully to prevent over-fertilization or runoff.
Bone meal	Used as a phosphorus source (about 12 percent).
Coir (coconut fiber)	Improves drainage; great worm bin bedding; replaces peat in potting mixes.
Compost	Best all-around soil conditioner; adds beneficial soil organisms that generate plant nutrients long after application; improves drainage and water-holding capacity; provides varying amounts of all plant nutrients – amounts depend on what materials compost is made from and how it is handled; buffers soil pH so effects of acid and alkaline conditions are reduced; improves nutrient exchange capacity.
Compost tea	Aerated compost tea is used as a soil drench or foliar application to add beneficial organisms and some soluble nutrients without the schlepping required with actual compost; compost extracts are simple cold infusions of compost without aeration and can provide some of the benefits of compost tea.
Cottonseed meal	Contains about 7 percent nitrogen but is not recommended because of the likelihood of pesticide residues.
Corn gluten meal	Contains about 10 percent nitrogen; also used as a pre-emergent weed killer, but moisture reduces its herbicide effect.
Fish meal (or pellets)	Contains about 10 percent nitrogen and 6 percent phosphorus.
Grit (quarter-ten crushed basalt)	Crushed rock of a size ranging from a quarter to a tenth of an inch without the powdery fines; folded into clay soil, it improves drainage; spread thinly over lawns, it makes great top-dressing.
Glacial rock dust	Great source of trace minerals.
Green manures	Legumes and grasses grown and then tilled into the soil to add nutrients and organic matter; fava beans, vetch, rye and clover are common.
Greensand	Great potassium and trace mineral source from mined marine deposits.
Gypsum	Good source of calcium for soils that are alkaline or neutral in pH; also provides sulfur; helps improve drainage only in soils uncommonly high in sodium.
Humic acid	One of the key components of finished compost and an excellent enhancer of soil nutrient exchange, biological activity and structure.

continued on next page

Soil amendments *continued*

7

Hydrogels (soil crystals)	Gels or crystals made from polyacrylamide are not recommended for garden uses because they can degrade into toxic acrylamide; cornstarch-based gels are fine; compost and mulch are great alternatives.
Iron	Though common in synthetic fertilizers, soluble iron is typically not needed and can permanently stain cement walkways.
Kelp meal	Great source of trace minerals and potassium; contains natural growth-stimulating hormones.
Legume inoculants	Added to soil or seed before planting beans and peas; live bacteria form nodules on roots and capture nitrogen from the air to reduce or replace fertilizer needs.
Lime	Used to increase pH of acid soils; avoid lime described as “quick,” “slaked” or “hydrated,” for it can harm soil organisms; ground limestone, agricultural lime and oyster shell lime are more gentle and equally effective; provides calcium for acid soils.
Manures	Barnyard manures including horse, cow, goat, chicken and rabbit provide macro- and micronutrients and are a good source of bulk soil conditioner; be sure they are well composted first, for weed seeds and human pathogens may otherwise be present; nutrient content varies by source, bedding materials and treatment during composting; avoid pet manures, which commonly contain human pathogens.
Mycorrhizal fungi	Applied to the soil as powders or solutions to inoculate roots of trees, shrubs and other plants; effectively extend root systems for improved nutrient and water absorption.
Peat moss	Used as amendment to improve drainage and as a component of potting mix; harvested from nonrenewable ancient deposits in sensitive bog ecosystems; compost or coir are great alternatives.
Perlite	White expanded volcanic rock used to improve drainage, especially in potting mixes.
Pumice	Used as a bulk soil amendment to improve drainage in heavy clay soils.
Sand	Used as a bulk soil amendment to improve drainage in heavy clay soils; used to top-dress lawns; avoid beach sand, which could add soil-damaging salts.
Sulfur	Elemental sulfur is sometimes used to lower pH in relatively rare cases of alkaline soil or sulfur deficiency; sometimes used in synthetic fertilizers as a coating for making material more slow-release; also contained in gypsum.
Vermiculite	Absorbent material made from expanded mica; used in some potting mixes and may contain asbestos; use compost instead, or be sure to avoid inhaling the dust by keeping it moist, using in a well-ventilated area or wearing a dust mask.
Wood ash	Contains potassium (about 6 percent) and phosphorus (about 25 percent), but use sparingly — it typically contains harmful salts and increases pH.
Worm castings	Compared to compost, they are more like a fertilizer than a bulk soil amendment, because they typically contain more macronutrients; also typically a good source of trace minerals; nutrient content varies by materials composted, bedding and handling.

How to choose a compost product

The look, feel and smell are the best first indicators. Good compost has a medium- to dark-brown color and a crumbly texture. It is neither extremely wet or dry and may feel warm, but it should not be hot. A mild, sweet, earthy odor indicates good maturity. Avoid compost with a strong rotten-egg or ammonia smell.

Ask questions. Find out what the compost is made from and whether it is tested for herbicides, pesticides, heavy metals, salts and weed seeds. Ask whether the compost has a U.S. Composting Council Seal of Testing Assurance (STA seal), or check the package for the seal.

What about possible contaminants? It is uncommon for commercial compost to have significant herbicide or pesticide residues, weed seeds or plant diseases because of the way it is processed in large facilities. Heavy metals also are uncommon, except sometimes in compost made from biosolids (sewage waste). Salts are a little more common – particularly in compost made from manures or food wastes – but are generally less of a problem, especially when the compost is applied when rains can wash salts from the soil.



Fertilizers

Fertilizers are materials added to the soil to provide essential plant nutrients including those listed below.

Nitrogen (N) fosters strong leaf growth.

Phosphorus (P) enhances roots and flowers.

Potassium (K), also known as potash, contributes to overall plant health.

Secondary nutrients such as calcium and sulfur foster strong stems and more.

Micronutrients such as copper and zinc contribute to plant health in a variety of ways.

Plants need nitrogen, phosphorus and potassium (N-P-K) in the largest quantities. The secondary nutrients and micronutrients are needed in smaller quantities. For tips on reading a fertilizer label, see page 59.

More is not better. Overfertilizing with any nutrient can cause plant stress, resulting in pest and disease problems. The excess material also can run off into local rivers, groundwater and streams, polluting them. Underfertilizing can bring about poor plant performance. Balance is the key. Two good rules of thumb: Don't fertilize at all, unless your plant's performance or a soil test indicates a need, and never apply more than recommended on the label.

Kick the chemical habit or use slow-release products. Synthetic chemical fertilizers typically feed plants fast but get used up or washed away quickly, unless they were manufactured to be slow-release or time-release. Synthetics also typically provide few if any secondary nutrients or micronutrients. Because they commonly contain very high N-P-K percentages, it can be tricky to avoid overfertilizing. This may lead to plant stress, pest and disease problems and polluted rivers, streams and groundwater. Organic or natural fertilizers are an excellent alternative.

Choose organic and natural fertilizers. Organic fertilizers are made from natural products. These can be actual organic materials (plant parts, animal wastes or animal byproducts) or materials of mineral origin (rocks or mined deposits). Typically organic fertilizers are slow-release, requiring less-frequent application. They are less likely to run off your soil and pollute rivers and streams and more likely to contain essential micronutrients and vital organic matter.

Apply fertilizers carefully. Try to avoid fertilizing right before heavy irrigation or a rainstorm, so your fertilizers don't run off your property and into storm drains, rivers or lakes. Spring is a good time to fertilize most plants, if they need it. Spring and fall are good times to fertilize lawns. Be careful not to get fertilizer on sidewalks or other impervious surfaces. After applying the fertilizer, either dig or water it into the soil enough so that it works its way in, but not so much that the material washes away.

Grasscycle (mulch mow) for free fertilizer. If you leave your clippings on the lawn you'll gain a free, natural supply of nitrogen and other nutrients each time you mow. Another benefit is the time you save by not having to rake or bag the clippings. Also, mulch mowing does not contribute to thatch.

Choose lawn fertilizers with an N-P-K ratio of 3-1-2. Lawns growing in typical Pacific Northwest soil will benefit most from a fertilizer with an N-P-K ratio of 3-1-2 or multiples thereof. For example, a 6-2-4 ratio will help a lawn thrive.

Weed and feed is a pesticide. You won't find weed and feed in the tables in this chapter because it is both a fertilizer and a pesticide. Most weed and feed contains both a synthetic fertilizer and three different herbicides (herbicides are pesticides). Protect your family and local waters by instead pulling or spot-treating individual weeds. See "Weed controls" in Chapter 4.

How to understand a fertilizer label

Plants need a variety of nutrients to survive. Fertilizer labels indicate the percentage of each of the three major nutrients nitrogen: phosphorus and potassium.

The N-P-K ratio is the amount of nitrogen, phosphorus and potassium in a fertilizer. For example, "5-5-5" on a label means the product contains 5 percent of each nutrient.

Nitrogen (N) helps plant foliage grow strong.

Phosphorus (P) helps roots and flowers grow and develop.

Potassium or potash (K) is important for overall plant health.

BIG & HEALTHY PLANT FOOD

5-5-5

(N) (P) (K)

GUARANTEED ANALYSIS:

Total Nitrogen	5%
1% Ammonium nitrogen	
4% Urea Nitrogen	
Available phosphoric acid	5%
Soluble potash	5%

Fertilizers with larger numbers (such as 29-2-3 or 18-16-10) are typically synthetic fertilizers. They can cause plants to grow rapidly but are often quickly depleted. They also are more likely to run off into lakes and streams or leach into groundwater, polluting the environment.

Time-release varieties pose less risk of runoff. If you use high-nutrient fertilizers, look for words such as "pelletized," "coated" or "slow-release" on the label.

Fertilizers with smaller numbers (such as 4-2-8 or 5-7-2) are likely organic fertilizers. These products tend to feed your plants slowly over time. They are often made from natural ingredients such as seeds, kelp or mineral deposits. They also may contain important secondary nutrients and micronutrients such as calcium and iron. Look for words such as "natural" and "organic" on fertilizer labels.

LAWN Fertilizers

Higher slow-release content means less chance of polluting local lakes and streams.

	Percent slow-release*	N-P-K (nitrogen-phosphorus-potassium)
Bradfield Organics® Luscious Lawn™ & Garden	100%	3-1-5
Bradfield Organics® Luscious Lawn™ Corn Gluten Organic Fertilizer	100%	9-0-0
Concern® Weed Prevention Plus®	100%	8-2-4
Whitney Farms® 100% Natural Lawn Food	94%	8-2-4
Espoma® Organic Weed Preventer Plus Lawn Food	91%	9-0-0
Scotts® Natural Lawn Food	91%	11-2-2
Happy Frog® Premium Lawn Fertilizer	90%	8-2-6
WorryFree® by Lilly Miller® Fall & Winter Lawn Food	90%	4-2-8
WorryFree® by Lilly Miller® Spring & Summer Lawn Food	90%	5-2-4
Down to Earth Bio-Turf®	88%	8-3-5
Ringer® Lawn Restore®	76%	10-2-6
Espoma® Organic Lawn Food	59%	7-2-2
Perfect Blend® Organics Organic-based Lawn Fertilizer	38%	8-5-5
Lilly Miller® Ultragreen® Fall & Winter Lawn Food	25%	24-4-12
Lilly Miller® Ultragreen® Lawn Food	25% **	28-2-3
Scotts® Starter Fertilizer	25% **	20-27-5
Sta-Green® Phosphorus-free Lawn Fertilizer w/ 2% iron	23% **	29-0-5
Sta-Green® Phosphorus-free Winterizer Lawn Fertilizer	22% **	22-0-14
Scotts® Turf Builder® Lawn Fertilizer	22% **	29-2-4
TurfKing™ Fall and Winter Lawn Fertilizer	15% **	23-3-6
TurfKing™ Lawn Fertilizer	15%	25-2-3
Lilly Miller® Seed & Sod Starter	4%	18-16-10
Master Nursery® Master Green™ Lawn Food	0%	25-6-4
Miracle Gro® Water Soluble Lawn Food	0%	36-6-6
Perfection Ammonium Sulfate	0%	21-0-0
Terracycle Lawn Fertilizer Liquefied Worm Poop	0%	5-1-1
Vigoro® Ammonium Sulfate	0%	21-0-0

* Percent slow-release refers to percentage of nitrogen (or phosphorus) that does not readily dissolve in water.

** Slow-release synthetic fertilizer.

GENERAL PURPOSE Fertilizers

Higher slow-release content means less chance of polluting local lakes and streams.

	Percent slow-release*	N-P-K (nitrogen-phosphorus-potassium)
Dr. Earth® Organic Rose & Flower Fertilizer	100%	5-7-2
Dr. Earth® Organic Tomato, Vegetable & Herb Fertilizer	100%	5-7-3
Dr. Earth® Organic All Purpose Fertilizer	100%	4-4-4
Dynamite® All Purpose Indoor & Outdoor Fertilizer	100% **	18-6-8
Dynamite® Flowers & Vegetables	100% **	13-13-13
Homemade Organic Fertilizer (See Recipe)	100%	3-2-6
Sweet Earth® Acid Lovers™ Fertilizer	100%	4-5-2
Sweet Earth® Total Advantage™ All Purpose Fertilizer	100%	4-4-4
Whitney Farms® All Purpose Plant Food	100%	5-5-5
Whitney Farms® All Natural Plant Food	100%	5-1-5
Whitney Farms® Azalea, Camellia and Rhododendron Food	100%	5-5-3
Whitney Farms® Bulb Food	100%	4-6-4
Whitney Farms® Tomato and Vegetable Food	100%	4-5-3
Whitney Farms® Rose & Flower Food	100%	4-6-2
Alaska® Sprayable All Purpose Plant Food	94%	9-4-4
Walt's Organics Rainy Pacific Northwest Blend	93%	7-4-9
Black Gold® Multicote® Controlled Release Fertilizer	90% **	15-7-15
Lilly Miller® Multicote™ Rose & Flower Food	90% **	14-14-16
Schultz® Extended Feed Flower and Vegetable Plant Food	90% **	17-17-17
Schultz® Extended Feed Flower & Vegetable Plant Food	90% **	17-17-17
Vigoro® Timed-Release Flower & Vegetable Plant Food	90% **	17-17-17
Vigoro® Timed-Release All Purpose Plant Food	90% **	19-6-12
Lilly Miller® Multicote™ Outdoor-Indoor Plant Food	90% **	18-6-12
Sta-Green® All Purpose Slow Release Plant Food	89% **	19-6-12
hendrikus organics Organobloom™ 5-2-4	87%	5-2-4
Osmocote® Smart Release® Plant Food: Flower & Vegetable	86% **	14-14-14
Osmocote® Smart Release® Plant Food: Flower & Vegetable	85% **	15-9-12
Osmocote® Smart Release® Outdoor-Indoor Plant Food	84% **	19-6-12
Down to Earth Vegan Mix	83%	3-2-2
hendrikus organics Complete™ 6-4-4	83%	6-4-4
E.B. Stone™ All Purpose Plant Food	80%	5-5-5
Grow More All Purpose Soil Builder	80%	5-5-5
Zoom!® Organic Garden Food	80%	4-6-4
Hendrikus Organics Seasons™ 8-2-4	75%	8-2-4
Lilly Miller® Vita-Start® Transplanting Fertilizer with Vitamin B1	75%	2-4-2
Lilly Miller® Compost Maker Plus	75%	4-4-2

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* Percent slow-release refers to percentage of nitrogen (or phosphorus) that does not readily dissolve in water.

** Slow-release synthetic fertilizer.

GENERAL PURPOSE Fertilizers

Higher slow-release content means less chance of polluting local lakes and streams.

	Percent slow-release*	N-P-K (nitrogen-phosphorus-potassium)
Espoma® Flower-tone® for Annuals and Perennials	73%	3-4-5
Espoma® Garden-tone® for Vegetables	73%	3-4-4
Black Gold® Azalea, Camellia & Rhododendron Fertilizer	72%	5-5-3
Black Gold® All Purpose Fertilizer	70%	5-5-5
Down to Earth Bio-Live	70%	5-4-2
Miracle-Gro® Shake 'n Feed® Continuous Release All Purpose Fertilizer	70% **	10-10-10
Black Gold® Tomato and Vegetable Fertilizer	68%	4-5-3
Miracle-Gro® Shake 'n Feed® Continuous Release Rose Plant Food	67% **	9-18-9
Black Gold® Rose and Flower Fertilizer	65%	4-6-2
Down to Earth Tree & Shrub Mix	65%	4-2-2
Espoma® Rose-tone®	65%	4-3-2
Espoma® Holly-tone® for Acid Loving Plants	63%	4-3-4
Lilly Miller® Bulb and Bloom Food	63%	4-10-10
Espoma® Tree-tone®	60%	6-3-2
Espoma® Plant-tone® for Organic Gardening	60%	5-3-3
Miracle-Gro® Organic Choice® All Purpose Organic Plant Food	60%	7-1-2
Scotts® Rose & Bloom Continuous Release Plant Food	54% **	12-4-8
Perfect Blend® Organics All Purpose Organic Fertilizer	52%	4-4-4
Lilly Miller® Morcrop Tomato and Vegetable Food	50%	5-10-10
Sta-Green® Azalea Camellia & Rhododendron Plant Food	50% **	14-7-7
Lilly Miller® Rose and Flower Food	48%	5-8-4
Hendrikus organics Spring Nitrogen™ 10-1-2	34%	10-1-2
Terracycle All Purpose Plant Food	33%	0-0-0
Lilly Miller® Rhododendron, Evergreen, and Azalea Food	28%	10-5-4
Lilly Miller® Azalea Camellia & Rhody Food	28%	10-5-4
Neptune's Harvest Fish and Seaweed Fertilizer	25%	2-3-1
Lilly Miller® All Purpose Planting and Growing Food	20%	10-10-10
Dr. Earth® Liquid Solution!™ Concentrate	20%	3-3-3
Drammatic® "O" All Natural Fish Fertilizer	16%	2-5-0.2
Alaska® Fish Fertilizer	15%	5-1-1
TurfKing™ All Purpose Plant Food	15% **	12-12-12
TurfKing™ Rose & Flower Food	15% **	4-10-8
TurfKing™ Azalea, Camellia, and Rhododendron Food	15% **	4-12-10
TurfKing™ Tomato and Vegetable Food	15% **	4-10-10

continued on next page

* Percent slow-release refers to percentage of nitrogen (or phosphorus) that does not readily dissolve in water.

** Slow-release synthetic fertilizer.

GENERAL PURPOSE Fertilizers

Higher slow-release content means less chance of polluting local lakes and streams.

	Percent slow-release*	N-P-K (nitrogen-phosphorus-potassium)
Vigoro® All Purpose Water Soluble Plant Food	11%	24-8-16
Green All (E.B. Stone™) Sure Start	4%	5-20-10
Alaska® Morbloom	0%	0-10-10
Al's All Purpose Water Soluble Fertilizer	0%	20-9-20
Colorburst® Flowering Plant Food	0%	10-15-10
Dyna-Gro™ Liquid Bloom Plant Food	0%	3-12-6
Dyna-Gro™ Liquid Grow Plant Food	0%	7-9-5
Fox Farm Cha Ching®	0%	9-50-10
Fox Farm Grow Big® Liquid Plant Food	0%	6-4-4
Fox Farm Open Sesame®	0%	5-45-19
Fox Farm Big Bloom® Liquid Plant Food	0%	0-0-0
Ironite® Liquid Lawn and Garden Spray	0%	6-2-1
Ironite Plus with 2% Iron	0%	12-10-10
Lilly Miller® All Purpose Lawn and Garden Food	0%	16-16-16
Lilly Miller® Vita-Bloom™	0%	0-10-10
Miracle-Gro® Liquafeed® Bloom Booster® Flower Food	0%	12-9-6
Miracle-Gro® Quick-start Planting and Transplant Starting Solution	0%	4-12-4
Miracle-Gro® Water Soluble All Purpose Plant Food	0%	24-8-16
Miracle-Gro® Water Soluble Azalea, Camellia, Rhododendron Plant Food	0%	30-10-10
Miracle-Gro® Water Soluble Bloom Booster Flower Food	0%	15-30-15
Miracle-Gro® Water Soluble Rose Plant Food	0%	18-24-16
Miracle-Gro® Water Soluble Tomato Plant Food	0%	18-18-21
Monty's Joy Juice Liquid Plant Food Growth Formula	0%	8-16-8
Peter's® Professional All Purpose Plant Food	0%	24-8-16
Pharm Solutions Fish Pharm Salmon Plant Food	0%	0-0-0
Portland Nursery Water Soluble All Purpose Plant Food	0%	20-20-20
Portland Rose Society Fertilizer™	0%	15-10-10
Spoonit® Premium Soluble Fuchsia Food	0%	14-16-10
Vigoro® Holland Bulb Booster®	0%	9-9-6
Vigoro® All Purpose Fertilizer	0%	16-16-16
Vigoro® Azalea, Camellia & Rhododendron Plant Food	0%	30-10-10

* Percent slow-release refers to percentage of nitrogen (or phosphorus) that does not readily dissolve in water.

** Slow-release synthetic fertilizer.



8 Resources

Books

Rodale's Color Handbook of Garden Insects, Rodale Press

Common-Sense Pest Control: Least-Toxic Solutions for Your Home, Garden, Pets and Community, Taunton Press

Encyclopedia of Northwest Native Plants for Gardens and Landscapes, Timber Press

Gardening with Native Plants of the Pacific Northwest, University of Washington Press

Insects and Gardens: In Pursuit of a Garden Ecology, Timber Press

Landscape Plant Problems: A Pictorial Diagnostic Manual, Washington State University Extension Publications

Naturescaping: A Landscaping Partnership with Nature, Oregon Department of Fish and Wildlife

The Organic Gardener's Handbook of Natural Insect and Disease Control: A Complete Problem-Solving Guide to Keeping Your Garden and Yard Healthy Without Chemicals, Rodale Books

Pacific Northwest Landscape Integrated Pest Management (IPM) Manual, Washington State University Extension

Pests of the Garden and Small Farm: A Grower's Guide to Using Less Pesticide, Second Edition, University of California Press

Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide, Second Edition, University of California Press

Weeds of the West, Western Society of Weed Science in cooperation with the Western United States Land Grant Universities Cooperative Extension Service

Western Garden Book, Eighth Edition, Oxmoor House

Books also available for free online

Pacific Northwest Insect Management Handbook, revised annually by the Extension services of Oregon State University, Washington State University and the University of Idaho: <http://insects.ippc.orst.edu/pnw/insects>

Pacific Northwest Plant Disease Management Handbook, Oregon State University Extension Service: <http://plant-disease.ippc.orst.edu>

Pacific Northwest Weed Management Handbook, revised annually by the Extension services of Oregon State University, Washington State University and the University of Idaho: <http://weeds.ippc.orst.edu/pnw/weeds>

Soil Biology Primer, Soil and Water Conservation Society: www.soils.usda.gov/sqi/concepts/soil_biology/biology.html

Mail order sources

You can buy seeds, plants, trees, fertilizers and natural pest control products from these sources.

Black Lake Organic

Organic fertilizers and supplies. Recipient of Washington State Environmental Excellence Award.

4711 Black Lake Blvd.
Olympia, WA 98512
360-786-0537
www.blacklakeorganic.com

Gardens Alive!

Organic products for lawn, soil and plant care and controls for insect pests, animal pests, diseases and weeds.

5100 Schenley Place
Lawrenceburg, IN 47025
513-354-1482
www.gardensalive.com

Harmony Farm Supply and Nursery

Organic garden and farm supply.

3244 Hwy. 116 North
Sebastopol, CA 95472
707-823-9125
www.harmonyfarm.com

One Green World

Fruiting trees, Northwest natives, berries and more. Recipient of City of Portland BEST award for sustainability.

28696 S. Cramer Rd
Molalla, OR 97038
503-651-3005
877-353-4028 toll free
www.onegreenworld.com

Peaceful Valley Farm & Garden Supply

Source for sustainable agriculture, certified organic farming and the home organic garden.

125 Clydesdale Court (retail store)
P.O. Box 2209 (mailing address)
Grass Valley, CA 95945
888-784-1722
www.groworganic.com

Raintree Nursery

Large-size fruit and nut trees, berries, grapes, unusual fruit, orchard/garden/landscape supplies, herbs, bees, books and videos.

391 Butts Road
Morton, WA 98356
360-496-6400
888-770-8358 (fax)
www.raintreenursery.com

Territorial Seed Co.

Vegetable, flower and herb seeds and plants.

20 Palmer Avenue (retail store)
P.O. Box 158 (mailing address)
Cottage Grove, OR 97424
800-626-0866
www.territorialseed.com

Walt's Organic Fertilizer Co.

Organic garden products and services.

1528 NW Leary Way
Seattle, WA 98107
206-297-9092 (shop)
206-783-6685 (office)
www.waltsorganic.com

Grow Smart, Grow Safe

partner information

Metro

Workshops and garden tours, shopping guides, fact sheets and related Internet links about least-toxic pest control, composting and beneficial insects:
www.oregonmetro.gov/garden

King County

King County Native Plant Guide

Native plant identification, landscaping plans and how-to articles:
www.kingcounty.gov/gonative

King County Northwest Natural Yard and Garden

Details on healthy-soil practices, safer pest control, native plants and rain barrels. Links to *Yard Talks* natural gardening show:
www.kingcounty.gov/environment/stewardship/nw-yard-and-garden.aspx

King County Noxious Weed Control Program

Descriptive photo index, weed lists and laws, maps and more:
www.kingcounty.gov/weeds

Local Hazardous Waste Management Program in King County

Photos and descriptions of beneficial insects and information on natural yard care, natural lawn care and pesticide disposal for households and small businesses:
www.govlink.org/hazwaste/index.cfm

Thurston County

Information on common sense gardening, pesticide-free neighborhood projects, garden tours, integrated pest management and more:
www.co.thurston.wa.us/health/ehcsg and www.co.thurston.wa.us/health/ehipm





Academic web sites

Oregon State University Extension Service

Gardening encyclopedia: <http://extension.oregonstate.edu/gardening>

University of California

Statewide Integrated Pest Management Program: www.ipm.ucdavis.edu

Washington State University

Management of vertebrate pests: <http://snohomish.wsu.edu/garden/vertchap.htm>

Extension programs in gardening: <http://extprograms.wsu.edu/gardening>

Integrated pest management: <http://pep.wsu.edu/Hortsense>

Government web sites

Clark County

Beneficial bugs and harmful pests, including photos, descriptions and tips:

www.clark.wa.gov/recycle/documents/bugbook2.pdf

City of Seattle

Natural lawn and garden care for homeowners, landscape professionals and homeowner associations: www.seattle.gov/util/services/yard

Integrated pest management fact sheets and other resources for Northwest landscape professionals: www.seattle.gov/util/services/yard/for_landscape_professionals/integrated_pest_management/index.asp

City of Tacoma

Natural yard care: www.cityoftacoma.org/page.aspx?hid=1431

East Multnomah Soil & Water Conservation District

Naturescaping: www.naturescape.org

National Sustainable Agriculture Information Service

Sustainable agriculture: <http://attra.ncat.org>

Oregon Department of Environmental Quality

Natural, safer practices for healthy lawns: www.healthylawns.org

Tacoma-Pierce County Health Department

Natural yard care and upcoming workshops: www.tpchd.org/page.php?id=429

Washington Department of Fish and Wildlife

“Living with Wildlife” fact sheets on managing conflicts with wild pests:
<http://wdfw.wa.gov/wlm/living/>

Nongovernmental organization web sites

Bio-Integral Resource Center

www.birc.org

The Garden Hotline

www.gardenhotline.org, 206-633-0224 or help@gardenhotline.org

IPM Education Project

www.ipmopedia.org

Northwest Coalition for Alternatives to Pesticides

www.pesticide.org

Oregon Tilth

www.tilth.org

Pesticide Action Network

www.panna.org

Plant Native

www.plantnative.com

Seattle Tilth

www.seattletilth.org

Toxics Use Reduction Institute

www.turi.org

Washington Toxics Coalition

www.watoxics.org

World Library of Toxicology

<http://toxipedia.org/display/toxipedia>



Disposal of pesticides and fertilizers

Many lawn and garden products can be harmful if improperly disposed of when no longer wanted. By switching to less-hazardous products, you can help reduce the expense of hazardous waste collection.

Pesticide disposal

Never place unused or partially used pesticides in the garbage or rinse them down the drain. Some older pesticide labels say that these products can be disposed of in the trash. This is not recommended, and newer labels no longer suggest it.

Take leftover pesticides to a hazardous waste disposal site. All counties in Washington and Oregon have hazardous waste collection programs for unwanted pesticides. These may include a permanent collection site or periodic collection events. Contact your county health department, public works department or solid waste agency for hours and locations. For direct contacts in specific areas, see below.

Hazardous waste disposal sites

Portland metropolitan area

Metro Recycling Information, 503-234-3000
8:30 a.m. to 5 p.m. Monday to Saturday
www.oregonmetro.gov/recycling

In Oregon, outside Portland metropolitan area

Oregon Department of Environmental Quality, 800-732-9253

Seattle and King County, Washington

Household Hazards Line, 206-296-4692 or 888-ToxicEd (888-869-4233)
9 a.m. to 4:30 p.m. Monday to Friday
www.govlink.org/hazwaste/house/disposal, haz.waste@kingcounty.gov

Pesticide disposal for small businesses, 206-263-8899
www.govlink.org/hazwaste/business

Thurston County, Washington

HazoHouse, 360-786-5494 (recorded line)
www.wheredoitakemy.org

Tacoma and Pierce County, Washington

Hazardous Waste Hotline, 800-287-6429
www.co.pierce.wa.us/pc/services/home/environ/waste/hazardous.htm

Fertilizer Disposal

The best thing to do with unwanted fertilizers is use them up as directed or give them to someone who can use them – perhaps a neighbor. Weed-and-feed products contain pesticides and should be taken to a hazardous waste collection site.



What's on your garden shelf?

The pesticides listed below have been canceled or restricted by the U.S. Environmental Protection Agency. EPA took these actions because of concerns about their effects on human health or the environment.

If you have any products containing these ingredients in your home, don't use them. Take them to a hazardous waste collection site.

2,4,5-T	Kepone
Aldrin	Lead arsenate
Clopyralid	Lindane (a few uses remain, such as lice shampoo)
Chlordane	Mirex
Chlorpyrifos	Pentachlorophenol
Diazinon	Silvex
DDT	Toxaphene
Dieldrin	
Heptachlor	

Index of reviewed products

A

ACE Green Turf Weed & Feed	36
ACE Spot Weed Killer 2	35
Atlas Chemical Corp. Giant Destroyer	51

B

Bayer Advanced 2-in-1 Moss & Algae Killer	44
Bayer Advanced All-In-One Lawn Weed & Crabgrass Killer Concentrate	37
Bayer Advanced All-In-One Lawn Weed & Crabgrass Killer RTS	37
Bayer Advanced All-In-One Lawn Weed & Crabgrass Killer RTU	37
Bayer Advanced Brush Killer Plus Concentrate	35
Bayer Advanced Brush Killer Plus RTU	35
Bayer Advanced Disease Control for Roses, Flowers, Shrubs	27
Bayer Advanced Dual Action Snail & Slug Killer Bait	21
Bayer Advanced Dual Protection Azalea, Camellia & Rhododendron Insect & Disease Control	27
Bayer Advanced Fungus Control for Lawns	26
BioDefend Deer & Rabbit Repellent with Extendex	49
Bird X Goose Chase Bird Repellent	51
Bird-B-Gone Clear Plastic Bird Spikes	49
Bonideç Fung-onil Multipurpose Fungicide RTU	27
Bonide Garden Dust	26
Bonide Infuse Systemic Disease Control	27
Bonide Mole Max Mole and Vole Repellent	49
Bonide Moletox II Mole & Gopher Killer	51
Bonide Moletox Baited Gel	51
Bonide Poison Ivy & Brush Killer BK-32 RTU	35
Bonide Shot-Gun Repels All Animal Repellent	49
Bonide Weed Beater Lawn Spot Weeder RTU	36
Bonide Weed Beater ULTRA Concentrate	37
Bonide Weed Beater ULTRA RTS	36
Bradfield Organics Luscious Lawn Granulated Corn Gluten	33

C

Chemsico Real Kill Ant Killer 2	15
Cinch Mole Trap (not legal in Washington)	49
Concern Copper Soap Fungicide	26
Concern Fast-Acting Weed Killer	38
Concern Weed Prevention Plus	33
Contech Scarecrow Outdoor Animal Deterrent Hose Attachment	49
Contech SlugsAway Electronic Slug and Snail Fence	21
Cooke Pest Granules	22
Corry's Bug Bait	17
Corry's Moss-B-Ware	44
Corry's Liquid Slug & Snail Control	21
Corry's Slug & Snail Death (Original & Pellets)	21
Corry's Slug & Snail Pellets (MP)	21
Crossbow Low Volatile Weed & Brush Herbicide	37

D

d-Con Bait Pellets Kills Rats & Mice	51
d-Con Rat & Mouse Bait Blocks Mini-Blocks	51
d-Con Ready Mixed Bait Bits Kills Mice & Rats	51
Deadline Force II Slug & Snail Killer	22
Deadline Rain Tough Slug & Snail Killer	22
Down to Earth Corn Weed Blocker	33
Dr. Earth 3-Controls Organic Fungicide	25
Dr. T's Mole Out Mole Repelling Granules	49

E

E.B. Stone Copper Soap Concentrate	26
Eliminator Dandelion & Clover Killer RTU	36
Eliminator Snail & Slug Bait II	21
Eliminator Weed & Grass Killer II RTU	39
Espoma Organic Weed Preventer Plus Lawn Food	33
Espoma Earth-tone 3 in 1 Disease Control Concentrate	26
Espoma Earth-tone 3 in 1 Disease Control RTU	26
Espoma Earth-tone 4 in 1 Weed Control	39
Espoma Earth-tone 4 in 1 Weed Control Concentrate	39
Espoma Earth-tone Insecticidal Soap	13
Exhart Mole Mover	49

F

Ferti-lome Crabgrass, Nutgrass & Dallisgrass Killer	36
Ferti-lome F-Stop	27
Ferti-lome Halt Systemic Rose, Flower, Lawn, Ornamental Fungicide	26
Ferti-lome Liquid Systemic Fungicide	27
Ferti-lome Over-The-Top Grass Killer RTU	35
Ferti-lome Weed-Free Zone RTU	37

G

Garden Safe Brand Moss & Algae Killer	44
Garden Safe Brand Weed & Grass Killer	38
Garden Safe Brand Fungicide 3 Concentrate	26
Garden Safe Brand Fungicide 3 RTU	26
Garden Safe Slug & Snail Bait	21
Garden Tech Daconil Fungicide	27
Garden Tech Daconil Fungicide Concentrate	27
Gardens Alive! Escar-Go! Slug & Snail Bait	21
Gardens Alive! Escar-Go! Supreme Insect, Slug & Snail Bait	21
Glue-type Mouse and Rat Traps	49
Grants Sure Stop Mole & Gopher Bait	51
Grants Sure Stop Mole Repellent	50
Grants Sure-Stop Mole & Gopher Bait	51
Green Light Amaze Grass & Weed Preventer 2	34
Green Light Cut Vine & Stump Killer	35
Green Light Fung-Away Systemic Lawn Fungicide	27
Green Light Organic Home & Garden Insect Spray	12
Green Light Organic Insect Control Concentrate	12

Green Light Organic Rose & Flower Spray Concentrate	12
Green Light Organic Rose & Flower Spray RTU	12
Green Light Plant & Flower Protector RTU	13
Green Light Portrait Broadleaf Weed Preventer	33
Green Light Rose Defense 70%	14
Green Light Rose Defense II RTU	14
Green Light Rose Defense RTU	13, 26
Green Light Rose Defense Concentrate	26
Green Light Snail and Bug Bait	22
Green Light Tomato & Vegetable Spray RTU	13
GreenCure Fungicide	25

H

Havahart Deer Off Deer, Rabbit and Squirrel Repellent	50
Havahart Get-Away Mole Repellent	50
Havahart Live Animal Traps – All Sizes	49
Hi-Yield 38 Plus Turf, Termite & Ornamental	17
Hi-Yield Bordeaux Mix Fungicide	26
Hi-Yield Dusting Wettable Sulfur	25
Hi-Yield Kill-A-Bug II Lawn Granules	16
Hi-Yield Turf Ranger Insect Control Granules	14
Homemade slug and snail traps	21
HotShot Flying Insect Killer	17
HotShot Ultra Liquid Ant Bait	16

J

JT Eaton AC Formula 90 Rodenticide	51
------------------------------------	----

K

Kaput Mole Gel Bait	51
---------------------	----

L

Lilly Miller Blackberry & Brush Killer	35
Lilly Miller Brush, Blackberry & Vine Brush Killer RTU	35
Lilly Miller Casoron Granules	33
Lilly Miller Cueva Copper Soap Fungicide	26
Lilly Miller Grasshopper, Earwig, Cutworm & Sowbug Bait	15
Lilly Miller Hose 'n Go Weed & Feed	36
Lilly Miller Hose 'n Go Slug & Snail Spray	22
Lilly Miller Hose 'n Go Dormant Spray for Insects	13
Lilly Miller Kop-R-Spray Concentrate	26
Lilly Miller Microcop / Sta-Stuk "M"	26
Lilly Miller Mole Repellent	50
Lilly Miller Moss Out! For Lawns Concentrate	43
Lilly Miller Moss Out! For Roofs & Structures	44
Lilly Miller Moss Out! For Roofs & Walks	44
Lilly Miller Moss Out! For Roofs Concentrate	44
Lilly Miller Moss Out! Plus Fertilizer	43
Lilly Miller Moss Out! Roof Strips	44
Lilly Miller Moss Out! Spot Treater RTU	43

Lilly Miller Multi-Purpose Fungicide RTU	25
Lilly Miller Noxall Vegetation Killer	34
Lilly Miller Slug & Snail Bait	21
Lilly Miller Slug + Snail Spray Hose 'n Go	22
Lilly Miller Slug, Snail & Insect Killer Bait	22
Lilly Miller Snail & Slug Mini-pellets	21
Lilly Miller Snail & Slug Spray RTU	21
Lilly Miller Superior Type Spray Oil	13
Lilly Miller Systemic Rose, Shrub & Flower Care	14
Lilly Miller Ultragreen Pro Weed & Feed	36
Lilly Miller Ultragreen Weed & Feed	36
Lilly Miller Vegol Growing Season Spray Oil	13
Lilly Miller Vegol Year Round Pesticidal Oil Concentrate	13
Lilly Miller Worry Free 3 in 1 Garden Spray	26
Lilly Miller Worry Free Ferramol Slug & Snail Bait	21
Lilly Miller Worry Free Garden Insect Control	14
Lilly Miller Worry Free Insecticidal Soap	13
Lilly Miller Worry Free Moss & Algae Control	44
Lilly Miller Worry Free Outdoor Dog, Cat & Bird Repellent Granules	49
Lilly Miller Worry Free Weed & Grass Killer for Organic Gardening Concentrate	38
Lilly Miller Worry Free Weed & Grass Killer for Organic Gardening RTU	38
Liquid Fence Deer & Rabbit Repellent	50

M

Master Nursery Pest Fighter Rose & Flower Insect Spray RTU	15
Messina Wildlife Deer Stopper	49
Messina Wildlife Mole & Vole Stopper	49
Miracle Gro Garden Weed Preventer & Plant Food	34
Monterey E-rase Concentrate Powdery Mildew Control	25
Monterey E-rase RTU Powdery Mildew Control	25
Monterey Fruit Tree & Vegetable Ornamental Fungicide	27
Monterey Garden Insect Spray	14
Monterey Herbicidal Soap Kills Moss, Algae & Weeds	44
Monterey No Goose Zone	50
Monterey Sluggo Plus Insect, Slug, and Snail Pellets	21
Monterey Sluggo	21
Monterey Weed Impede	33
Mountain Bluebird Spider Elimination Kit	11

N

Natural Guard Lawn, Plant, and Pet Insect Spray	12
Natural Guard Spinosad Landscape & Garden Insecticide	14
Natural Pest Solutions Deer Solution	49
Nature's Avenger Organic Herbicide Concentrate Weed Controller	38
Nature's Glory Weed & Grass Killer	39
New Mountain 100% Natural Sandalwood Mosquito Sticks	12
Nott Mole-Nots	51
NuLife Rid-Moss	43

O

Oak Stump Farms Aphid Chaser	11
Oak Stump Farms Apple Maggot Trap	11
Oak Stump Farms Codling Moth Trap	11
Oak Stump Farms Fly Lure	11
Oak Stump Farms Mosquito and Flying Insect Bait Trap	11
Oak Stump Farms Slug Lure	21
Oak Stump Farms Slug Trap	21
Oak Stump Farms Yellow Jacket & Wasp Trap (or Lure)	11
Off Citronella Bucket	12
Off Mosquito Coil III	17
Off PowerPad Lamp/Lantern and Refills	17
Orange Guard Kills on Contact	13
Organocide Organic Insecticide & Fungicide	25
Organocide Organic Insecticide Fungicide	25
Organocide Organic Insecticide Fungicide Concentrate	12
Organocide Organic Insecticide Fungicide RTU	12
Ortho Volck Oil Spray	13
Ortho Ant-B-Gon Bait	17
Ortho Ant-B-Gon Dust	17
Ortho Bug-B-Gon MAX Garden & Landscape Insect Killer RTU	16
Ortho Bug-B-Gon MAX Insect Killer for Lawns Granules	15
Ortho Bug-B-Gon MAX Lawn & Garden Insect Killer Concentrate	16
Ortho Bug-Geta Plus Slug, Snail and Insect Killer	17
Ortho Grass-B-Gon Garden Grass Killer	35
Ortho Ground Clear Complete Vegetation Killer Concentrate	40
Ortho GroundClear Complete Vegetation Killer RTU	39
Ortho Home Defense MAX Insect Killer Granules	15
Ortho Home Defense MAX Termite and Destructive Bug Killer Concentrate	16
Ortho Home Defense MAX Wasp & Hornet Killer	15
Ortho Lawn Disease Control	27
Ortho Malathion Plus Insect Spray Concentrate	17
Ortho Max Lawn and Garden Insect Killer Granules	16
Ortho MAX Poison Ivy & Tough Brush Concentrate	35
Ortho MAX Poison Ivy & Tough Brush Killer RTU	35
Ortho MAX Garden Disease Control	27
Ortho Orthenex Insect & Disease Control Aerosol	17
Ortho Orthenex Insect & Disease Control Aerosol	27
Ortho Orthenex Garden Insect & Disease Control Concentrate	18
Ortho Rose & Flower Insect Killer	16
Ortho Rose Pride Rose & Shrub Disease Control Concentrate	27
Ortho Season Long Control Insect Killer for Lawns	15
Ortho Season-Long Max Weed & Grass Killer Plus Preventer Concentrate	39
Ortho Season-Long Grass & Weed Killer RTU	39
Ortho Systemic Insect Killer Concentrate	18
Ortho Total Kill Brand Lawn Weed Killer Concentrate	36
Ortho Total Kill Brand Lawn Weed Killer RTU	36
Ortho Total Kill Brand Vegetation Killer Concentrate	40
Ortho Total Kill Brand Weed & Grass Killer Super Concentrate	39
Ortho Total Kill Brand Lawn and Garden Insect Killer Concentrate	17

Ortho Total Kill Lawn & Garden Insect Killer	15
Ortho Total Kill Wasp & Hornet Killer	15
Ortho Weed-B-Gon MAX Plus Crabgrass Control for Lawns RTU	37
Ortho Weed-B-Gon Chickweed, Clover and Oxalis Killer for Lawns	35
Ortho Weed-B-Gon Crabgrass Killer for Lawns Concentrate	36
Ortho Weed-B-Gon MAX Plus Crabgrass Killer for Lawns RTS	37
Ortho Weed-B-Gon MAX Weed Killer For Lawns Concentrate	37
Ortho Weed-B-Gon MAX Weed Killer for Lawns RTU	36
Ortho Weed-B-Gon MAX plus Crabgrass Killer for Lawns RTU	37
Ortho Weed-B-Gone Crabgrass Killer for Lawns RTU	36

P

Perfectly Natural Moss Killer	44
Perfectly Natural Weed 'n Grass Killer	38
Pharm Solutions Flower Pharm	12, 25
Pharm Solutions Garlic Pharm	12
Pharm Solutions Oil Pharm Organic Summer Oil	12
Pharm Solutions Rose Pharm	12
Pharm Solutions Veggie Pharm	12
Pic Citronella Sticks	12
Pic Fly Ribbon	11
Pic Window Fly Trap	11
Pic Yellow Jacket & Wasp Trap	11
Pick and squish	21
Plantskydd Deer-Rabbits-Elk Repellent	50
Preen Garden Weed Preventer	34
Preen Lawn STEPSAVER Weed Control plus Fertilizer	37
Preen Mulch Plus	34
Preen Vegetable Garden Weed Preventer	33
Preen Weed Preventer with Brilliant Blooms Fertilizer	34

Q

Quick Kill Mosquito Bits	13
--------------------------	----

R

Raid Disposable Yellow Jacket Trap	11
Raid Earth Options Ant & Roach Killer	13
Raid Outdoor Ant Spikes	15
Raid Yellow Jacket Trap	11
Real Kill Ant Bait	14
Repel Outdoor Fogger, Camp Fogger	17
Rescue Fly Trap (and Attractant)	11
Rescue Yellow Jacket Trap (and Attractant)	11
Revenge Rodent Smoke Bomb	51
Roundup Extended Control Weed & Grass Killer Plus Weed Preventer 2 RTU	39
Roundup Extended Control Weed & Grass Killer Plus Weed Preventer Concentrate	39
Roundup Extended Control Weed & Grass Killer Plus Weed Preventer RTU	39
Roundup Poison Ivy & Tough Brush Killer Plus Concentrate	39
Roundup Poison Ivy Plus Tough Brush Killer RTU	39
Roundup Weed & Grass Killer Concentrate Plus	39

Roundup Weed & Grass Killer RTU Plus	39
Roundup Weed & Grass Killer Super Concentrate	39
S	
Safer 3 in 1 Garden Spray 2 RTU	26
Safer 3 in 1 Garden Spray Concentrate	14
Safer 3 in 1 Garden Spray RTU	14
Safer Ant & Crawling Insect Killer	13
Safer BioNEEM Insecticide & Repellent	13
Safer Caterpillar Killer	13
Safer Diatomaceous Earth	13
Safer Fast Acting Weed & Grass Killer RTU	38
Safer Flying Insect Killer	14
Safer Fruit & Vegetable Insect Killer II	14
Safer Garden Dust	13
Safer Gypsy Moth Trap	11
Safer Insect Killing Soap	14
Safer Moss & Algae Killer & Surface Cleaner RTU	44
Safer Rose & Flower Insect Killer II	14
Safer Slug & Snail Copper Barrier Tape	21
Safer Sticky Whitefly Trap	11
Safer Tomato & Vegetable Insect Killer II RTU	14
Safer Yard & Garden Insect Killer II	14
Schawbel Colorfusion Citronella Candle	12
Schultz Supreme Green Crabgrass Preventer with Fertilizer	34
Scoot Products Deer & Rabbit Repellent	50
Scoot Products Mole Repellent	50
Scoot Products Squirrel Repellent	50
Scotts GrubEx Season-Long Grub Control	17
Scotts Halts Crabgrass Preventer	33
Scotts Lawn Pro 4-Step Program Step 1 for Seeding Starter Fertilizer with Crabgrass Preventer	34
Scotts Lawn Pro Super Turf Builder with PLUS 2 Weed Control	35
Scotts Liquid Turf Builder with PLUS 2 Weed Control 25-1-2 Lawn Fertilizer and Broadleaf Weed Control	36
Scotts Moss Control Granules for Lawns	43
Scotts Ortho Max Garden & Landscape Insect Killer	15
Scotts Outdoor Defense Citronella Candle	12
Scotts Outdoor Defense Insect Killer Area Fogger	15
Scotts Turf Builder WinterGuard With PLUS 2 Weed Control	35
Scotts Turf Builder with Halts Crabgrass Preventer	33
Scotts Turf Builder with Moss Control	43
Scotts Turf Builder with PLUS 2 Weed Control	35
Seabright Laboratories Sticky Thrip Leafminer Trap	11
Serenade Garden Lawn Disease Control	25
Shake Away Deer Repellent – Coyote Urine Powder Packs	50
Shake Away Rodent Repellent	50
Slug-X Trap	21
Snap-type Mouse and Rat Traps	49
Spectracide Ant Shield Home Barrier Granules	16
Spectracide Ant Shield Home Barrier Granules 2	16
Spectracide Ant Shield Home Barrier Insect Killer 2	17

Spectracide Bug Stop for Gardens	15
Spectracide Bug Stop Indoor Plus Outdoor Insect Killer	15
Spectracide Carpenter Ant and Termite Killer	16
Spectracide Commercial Wasp & Hornet Killer 2	17
Spectracide Destroyer Wasp & Hornet Killer	14
Spectracide Garden Insect Killer	15
Spectracide Immunox 3-in-1 Insect & Disease Control Plus Fertilizer	17
Spectracide Immunox Lawn Disease Control	27
Spectracide Immunox Plus Insect & Disease Control	27
Spectracide Immunox Plus Insect & Disease Control Concentrate	17
Spectracide Malathion Insect Spray	16
Spectracide Systemic Rose & Flowering Shrub Insect Control & Fertilizer	17
Spectracide Systemic Tree & Shrub Insect Control & Fertilizer	17
Spectracide Terminate Termite & Carpenter Ant Killer 2	15
Spectracide Triazicide Insect Killer 2 Once & Done!	16
Spectracide Triazicide Insect Killer Once & Done!	16
Spectracide Triazicide Insect Killer Once & Done! Granules	15
Spectracide Triple Strike Grass Weed Root Killer2 Concentrate	40
Spectracide Weed & Grass Killer RTU	40
Spectracide Weed Stop 2X Weed Killer for Lawns Concentrate	36
Spectracide Weed Stop 2X Weed Killer for Lawns RTU	36
Spectracide Weed Stop for Lawns Concentrate plus Crabgrass Killer	37
Spectracide Weed Stop for Lawns plus Crabgrass Killer RTU	37
SpectracidePRO Wasp & Hornet Killer	16
St. Gabriel Laboratories BurnOut II Weed & Grass Killer Concentrate	38
St. Gabriel Laboratories BurnOut II Weed & Grass Killer RTU	38
St. Gabriel Organics Diatomaceous Earth Insect Dust	13
Sta-Green Phosphorus-free Weed & Feed	36
Stinger Nosquito 2 in 1 Power Bait	13
Stinger Nosquito Mosquito Octenol Lure	13
Summit Mosquito Dunks	12
Surefire Crawling Insect Killer	14
Sweeney's Mole & Gopher Repellent	50
Sweeney's Mole & Gopher Repellent	50
Sweeney's Mole & Gopher Sonic Spike	49
Sweeney's No Mess Paste Bait	51
Sweeney's Poison Peanuts	51

T	
Tanglefoot Bird Repellent	51
Tanglefoot Codling Moth Trap	11
Tanglefoot Sticky Tree Bands	11
Tanglefoot Tree Tangle Foot Pest Barrier	11
TAT Ant Bait	17
Terro Ant Dust	14
Terro Ant Killer Outdoor	16
Terro Ant Killer Plus Multi-purpose Insect Control 2	16
Terro Ant Killer Plus Outdoor Multi-purpose Insect Control	17
Terro Carpenter Ant & Termite Killer Concentrate	15
Terro Carpenter Ant & Termite Killer Spray	16

Terro Mosquito Killer Yard & Patio Fogger	16
Terro Spider Killer Spray	16
ThermaCELL Mosquito Repellent Lantern	15
Tomcat Glue Traps with Eugenol	49
Tomcat Mouse Trap Kit: No-touch Trap with Attractant	49
Tomcat Ultra Pelleted Mouse & Rat Bait	51
Tomcat Ultra Pre-filled Bait Trays	51
Turf King Pennington Lawn Fertilizer & Controls Crabgrass	33
TurfKing Lawn Fertilizer & Moss Control	43
TurfKing Lawn Moss Control	43

U

Ultra Kill Home Insect Killer	15
Ultra Kill Wasp & Hornet Killer	16

V

Victor Fly Magnet Bag Trap	11
Victor Flycatcher Fly Ribbon	11
Victor Mouse Bait Packs	51
Victor Poison-Free Ant & Roach Killer	12
Victor Poison-Free Disposable Fly Traps with Bait	11
Victor Poison-Free Flying Insect Killer	12
Victor Poison-Free Hobo Spider Trap	11
Victor Poison-Free Wasp & Hornet Killer	12
Victor Rat & Mouse Place Packs	51
Victor Window Fly Trap	11
Victor Yellow Jacket Magnet Bag Trap	11
Vigoro Premium Mulch with Weed Stop	34
Vigoro Ultra Turf Crabgrass Preventer	34
Vigoro Ultra Turf Moss-Ex Lawn Granules	43
Vigoro Ultra Turf Phosphorus-Free Winterizer Weed & Feed 2	35
Vigoro Ultra Turf Weed & Feed RTS	36
Vigoro Ultra Turf Weed & Feed	36
VPG Natural Guard Crawling Insect Control	13

W

WeedEx Dandelion Stick RTU	36
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Grow Smart, Grow Safe is a must-have for Pacific Northwest gardeners looking to green up their gardening practices. Inside you will find tables ranking 600 pest controls and fertilizers from lowest to highest hazard for people, pets and the planet. This consumer guide is also packed with expert tips for the most effective, least toxic lawn and garden care techniques. You can grow a beautiful, productive garden and protect the ones you love from hazardous garden chemicals with the science-based advice in this groundbreaking publication.

Poisoning emergencies

Oregon Poison Center

800-222-1222 or www.ohsu.edu/poison

Washington Poison Center

800-222-1222 or www.wapc.org



Metro



**Local Hazardous Waste
Management Program
in King County, Washington**