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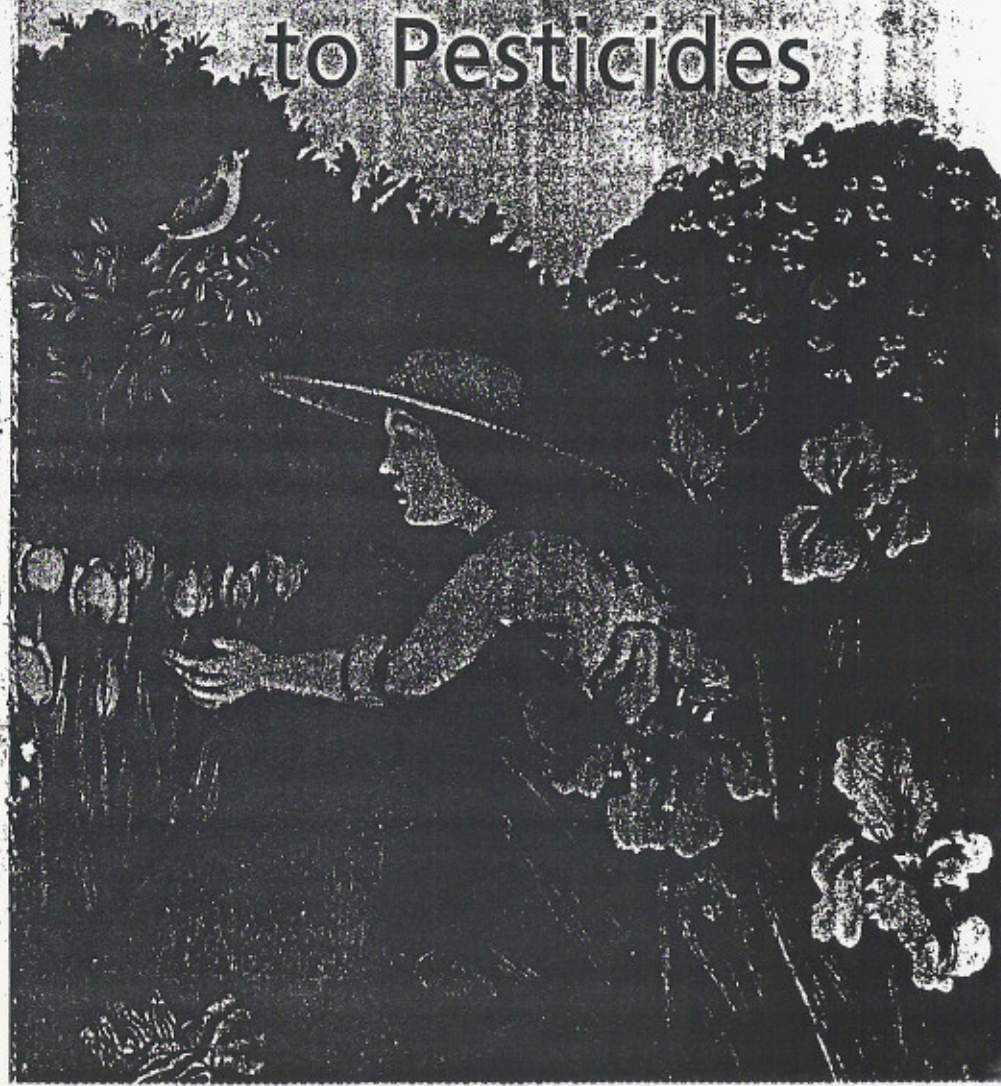
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*Common Sense
Gardening*

A Guide to Alternatives to Pesticides



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Rodale's Garden Problem Solver
Rodale Press
1988

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*Basic Guide to Pesticides:
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1991

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University of California
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Control of Aphids*
The Memphremagog Group
1981

Kourik, Robert,
*Designing and Maintaining Your
Edible Landscape Naturally*
Metamorphic Press
1986

Least Toxic Lawn Management
BioIntegral Resource Center
PO Box 7414
Berkeley, CA 94707

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Rodale Press
Emmaus, PA

Olkowski, William, et al
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Taunton Press
1991

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Michael Friedman Publishing
1993

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Rodale Press
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Rodale Press
1984

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Metro Recycling Information

234-3000

(Call for detailed "Alternatives" fact sheets about pest control, a free booklet about hazardous household products, information about free workshops on alternatives to pesticides and home composting, and general recycling and waste disposal information.)

OSU Extension Service

Master Gardeners Information Line
Multnomah County (503) 252-5386
Clackamas County (503) 655-8631
Washington County (503) 681-7007

Portland Nursery

5050 SE Stark St., Portland, OR 97215
(503) 231-5050

Northwest Coalition for Alternatives to Pesticides

PO Box 1393, Eugene, OR 97440
(503) 344-5044

Washington Toxics Coalition

4516 University Way NE, Seattle, WA 98105
(206) 632-1545

Bio-Integral Resource Center

PO Box 7414, Berkeley, CA 94707
(510) 524-2567



insecticides, meaning you must wet the pest for them to be effective. As always, follow package directions and cautions when using these products.

Neem – a relatively new botanical insecticide derived from a tree. This product is reported to be very effective, with slightly more staying power than some other botanical insecticides. It does, however, break down completely and is less toxic to humans than some botanicals.

Pheromone – a chemical substance produced by insects and animals that stimulates certain behavior of other members of the same species. Traps use female pheromones to attract males and prevent reproduction.

Pyrethrum – an effective, short-lived, naturally derived insecticide made from chrysanthemum flowers. It is toxic to all insects, including beneficial ones, and moderately toxic to birds and mammals. It should be the last resort for ornamentals and is not recommended on food crops. Avoid using formulations that contain piperonyl butoxide, which is currently being evaluated for its carcinogenicity. Pyrethrins are the individual chemicals found in pyrethrum. Pyrethroids are a new array of synthetic chemicals, such as cyfluthrin and cypermethrin. They resist breakdown, thus negating their major environmental advantage. With the three names being so similar, they can easily be confused. Pyrethrum is the least hazardous.

Rotenone – a tropical plant-derived insecticide that is harmful to insects, fish, birds and mammals. Read labels to see if the product is mixed with other pesticides. Check the label to see if the pest problem and the plant you want to protect are listed. It is toxic and should be handled with care. Follow label instructions exactly.

Ryania – a shrub native to South America is the source of this insecticide. It incapacitates fruit moths, corn borers, codling moths and imported cabbage worms. As always, read the label before you buy to see what other ingredients may be mixed with it and if it is safe to use on your particular plants.

Sabadilla – the seeds of this South and Central American plant are ground into a powerful insecticidal dust. It is effective against grasshoppers, codling moth larva, webworm, aphid, cabbage looper, chinch bug and many household pests. It can irritate mucous membranes and cause sneezing. Honeybees are vulnerable to it. Handle it carefully.

Introduction: How Does Your Garden Grow?

Some home gardeners use mind-boggling amounts of pesticides that can pollute our water and harm friendly insects, birds, wildlife, pets, children and the gardener using them. Pesticides (including insecticides, herbicides and fungicides) that end up as trash create a dangerous and expensive disposal problem that we all pay for. Using pesticides may be necessary at times, but in many cases there are alternatives that are often more effective in the long run and less harmful to the environment and the applicator.

While the environmental problems of the world may seem beyond your control, you can make a difference right in your own backyard. Begin by using this guide to choose the least-harmful methods for managing insect pests, weeds and diseases in your yard before reaching for chemical controls. You may be an experienced organic gardener or a beginner whose first step is picking up this booklet. In either case, we hope it will help you learn about effective, often less expensive, ways of dealing with pests and weeds.

This guide is intended to provide a safer strategy, a hierarchy of steps to take before reaching for chemicals for managing weeds, insect pests and diseases common to gardens in the Pacific Northwest. This is not a comprehensive resource. Refer to the "Resources" section beginning on page 40 for a list of books, magazines and organizations to consult for additional information.

Happy and healthy gardening!

Healthy Yard and Garden Hints

Had Benjamin Franklin considered the subject, he would have agreed that an ounce of prevention is worth a pound of pesticides. Applying the following strategy will go a long way in keeping trouble outside your garden gate.

Good gardening techniques

You can prevent many problems by practicing good gardening techniques. Always start with healthy, strong plants, and give them adequate support to increase their natural resistance to bugs and diseases. Soils should contain organic material such as compost and the full range of balanced nutrients. Be sure the plant is receiving proper fertilizer and adequate watering at recommended intervals throughout the year. Simply adding more fertilizer will not help if it is the wrong type. For example, too much nitrogen can promote insect and disease problems. Draw on the multiple benefits of mulching to control weeds, conserve water and improve your soil. Proper pruning can improve the health of your trees and shrubs and facilitate good air circulation to prevent disease. Improper pruning gives access for disease and insects.

Suitable plants

Choose plant species and varieties that are well adapted to your climate, soil conditions and available light levels. Avoid species that are known to attract pests. When buying new plants or planning a vegetable garden, consult a nursery, the library or the OSU Extension Master Gardeners in your county for suggestions of plant varieties that are resistant to insects and diseases common to your area. You may also want to research companion planting from books on the topic.

Diseased foliage

Remove diseased foliage as soon as you can. While removing diseased foliage alone will not eliminate chronic diseases such as blackspot, it will help prevent infected foliage from reinfesting the plant. Do not put diseased foliage into your compost bin. The disease organisms may not be killed in the composting process. They may reinfest your plants when the compost is used.

Glossary

Bacillus thuringiensis (BT) – a bacteria used to control certain pest larvae, primarily caterpillars. BT is not toxic to humans or other mammals, but BT will kill butterfly (“friendly”) caterpillars as well as the problem ones. The bacteria kills larvae by interfering with digestion. BT lasts on leaf surfaces five to seven days and must be ingested to be effective. There are many strains of BT commercially available now, including strains for controlling mosquito and beetle larvae.

Boric acid – slow acting, low-toxicity, long-lasting (if kept dry) powder that is effective against ants, cockroaches and other structural pests. It is a digestive and contact poison and is usually applied as a dust. Products often come with a duster-type applicator. It is toxic if ingested, inhaled or comes into contact with abraded or broken skin. It poses a risk to children and pets if they come into contact with it. It is safe to place it in wall voids because it does not evaporate and cannot enter living spaces.

Diatomaceous earth – made from ground up fossils, it comes in a powder form and is very abrasive. It is a dust that abrades the skin and body joints of insects. Dry diatomaceous earth makes an effective slug barrier. Do not inhale the dust.

Dormant oils – act by coating the plant surface and suffocating any insects that are present. Target pests are aphids, mites, scale insects, whiteflies and eggs of many pests, including some caterpillars. Dormant oils are meant for use on leafless, deciduous plants (especially fruit trees) in the winter to reduce pest populations before they hatch. If used in summer, these oils might defoliate the tree.

Horticultural oils – also called summer oils, these are more highly refined than dormant oils, making them appropriate for use on leaves during the growing season. Consult a nursery to locate a suitable product and follow all precautions. Don't use horticultural oils when plants are flowering.

Insecticidal soaps – highly refined liquid soaps (technically the potassium salt of fatty acids), sometimes combined with citrus oil. Soaps are normally mixed with water and sprayed onto leaves to control spider mites, aphids, scale insects, whiteflies and other soft-bodied insects. They are contact

Scab

Scab is a name given to several fungus diseases. One infects apple and other fruit trees, another infects cucumbers and yet another can infect potatoes. On fruit trees, scab generally appears first on the undersides of the leaves as pale yellow spots that gradually darken until they are nearly black. Leaves may have numerous scab spots and become distorted. The scab fungus overwinters on the fallen infected leaves, producing spores in spring. The spores are wind-borne and infect the young leaves and fruit during periods of rain. Warm rainy weather is ideal for scab.

Prevention:

For potatoes, scab is particularly severe in alkaline soils and usually worse in dry soil. Avoid using lime, fresh manure or wood ashes on your potato beds, as these will increase the alkalinity. If potato scab has been a problem, you should practice a three to five-year crop rotation schedule. Always plant resistant varieties of potatoes and apples.

Physical control:

Because the fruit tree fungus spends the winter on fallen infected leaves, rake them up carefully and dispose of them. Careful pruning for good air circulation creates a less favorable environment for the spread of scab.

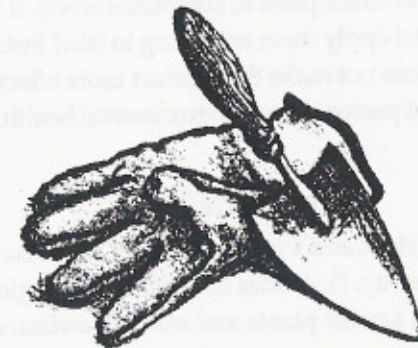
Least-toxic chemical control:

Dormant lime sulfur sprayed on the fruit trees during the winter will help control it. In the spring, if your plants are in serious trouble, continue using lime-sulfur spray or wettable sulfur.

Tolerance level

To move toward reducing pesticide use, you may need to adjust your tolerance level. Most insects are not harmful, and some insects are actually beneficial, feeding on harmful pests. Before running for the bug spray, find out what the insect is and if it is doing any damage. Otherwise, you may unknowingly destroy a friendly predator. Chances are, if there isn't a large population of a particular insect, natural predators will take care of the problem. Have a little patience and give them a chance to work. In the fall and winter, insects may enter your house to find a warm place. Aside from sweeping or vacuuming, you may not have to interfere at all. Remember: One bug does not a problem make.

The same is true of weeds. Learn to tolerate a few of them. Concentrate your control efforts on perennial weeds, especially those that spread by creeping roots. Prevent and pull what you can, then use the money you save on herbicides to buy bedding plants or gardening tools.



Pesticides: Botanical or Synthetic?

Although preventive gardening will minimize the need for pesticides, there may be times when you choose to use them. In order to make informed decisions, it's important to understand them.

There are two broad categories of pesticides. Botanical pesticides are made from natural materials such as roots, bark and flowers. Synthetic pesticides are derived from petrochemicals. Both types are toxic to living things. Always follow label instructions carefully when using either type.

The main difference between botanical and synthetic substances is that botanicals do not accumulate in the environment; they break down fairly rapidly. For example, pyrethrum, an organic insecticide, is more toxic than malathion, a synthetic. However, pyrethrum degrades when exposed to sunlight for 12 hours or less. Synthetics, on the other hand, have more staying power and can travel higher in the food chain, increasing in concentration.

Some pesticides can actually increase pest populations because they may kill natural predators that usually control plant-eating insects. Also, insects can develop resistance to chemical controls. It is wise to avoid these substances if possible and use them only if prevention, physical controls and biological controls fail to reduce pests to acceptable levels. If your choice is to use pesticides, mix and apply them according to label instructions. Increasing the dosage does not make the product more effective and greatly increases concerns about personal and environmental health.

Water Quality

Many of the pesticides and fertilizers used at home can cause water quality problems miles away. Pesticides can pollute our region's streams and rivers, harming fish, aquatic plants and animals, swimmers, and those who eat the fish they catch.

Water from rain or irrigation carries pesticides and fertilizers from lawns and gardens into nearby street drains. Many street drains feed directly to neighborhood waterways. Once in the water, pesticides dissolve, dilute or combine with other chemicals to create harmful combinations that can kill fish and aquatic life, limit beneficial plants and animals and increase

humidity and is commonly found on fruit trees, roses and big shade trees. Rain inhibits it and warm, damp nights encourage it. It can cause stunting and distortion of leaves, buds and growing tips, a general decline in plant growth, yellowing of leaves and premature leaf fall.

Physical control:

Prune and thin out excess branches to increase air circulation. Plant resistant varieties, and put them in sunny locations.

Least-toxic chemical control:

Spray with a mixture of 3 teaspoons baking soda, 2 1/2 tablespoons horticultural oil and 1/2 teaspoon insecticidal soap. Spray this on an unobtrusive area of your plant first, and watch for signs of adverse effects before spraying your entire plant.

Rust

Rust is a fungus with orange to brownish pustules on the underside and pale yellow spots on the tops of grass blades, snapdragon or hollyhock leaves, raspberries and rose bushes. It is common on Kentucky bluegrass and on the weed, annual bluegrass.

Prevention:

Pick off and destroy affected leaves as soon as they are noticed. Leaves must be wet for four hours to become infected, so careful watering can help prevent it.

Mow the lawn shorter to improve air circulation, and apply a nitrogen-predominant fertilizer that contains sulfur. Choose a grass seed mixture containing fine fescues and perennial rye grass, two species that are less susceptible to rust.

Least-toxic chemical control:

Periodic dustings of sulfur have been found to be effective, but you should not need this unless preventive measures have failed. Sulfur can be highly irritating to the respiratory system. Wear nose and mouth protection when applying.

Diseases

Black spot

Black spot is a fungus common to rose bushes. Symptoms appear as coal-black lesions on upper and lower surfaces of leaves. Heavily diseased leaves tend to turn yellow and drop prematurely. When excessive premature defoliation occurs, the plant forms a new set of leaves, which causes a considerable drain on food reserves in the roots. This results in a weakened plant with poorly matured wood. A few days after the spots first appear, little black pimples show up in the spots; this signals that the spores are about to be discharged and you should act fast to remove and discard those leaves. Spores are carried by air currents, insects, tools, hands and clothing.

Prevention:

When selecting a rose bush to buy, consult a knowledgeable nursery person or the OSU Extension agent or Master Gardeners for varieties that are less prone to black spot. Some varieties are more susceptible than others.

Physical control:

Remove infected leaves from the bush and those already fallen on the ground so they can't reinfest the plant. Prune away excess foliage and sickly canes to improve air circulation. In the spring, remove the mulch around the base of the plant and rake the ground thoroughly to expose it to the sun. When new shoots appear, apply generous amounts of new mulch. Never water roses from overhead. Keep the foliage as dry as possible because dry leaves won't support the fungus.

Least-toxic chemical control:

Dust with a finely ground sulfur when temperatures are under 85 degrees. It tends to burn leaves if applied in very hot weather. Or spray with a mixture of 3 teaspoons baking soda, 2 1/2 tablespoons horticultural oil and 1/2 teaspoon insecticidal soap. Spray with this solution every 10 to 14 days during the growing season.

Powdery mildew

Powdery mildew is a white or grayish powdery coating on the surfaces of leaves, stems and buds. It germinates on dry leaves in high

algae growth. Excess algae growth causes light deficiencies for plants and depletes oxygen levels that fish need to survive.

Clean water is an essential part of our quality of life. We can help protect our rivers, streams and lakes by rethinking and reducing our use of pesticides and other household chemicals.

Safety

Use extreme caution when applying any type of chemical, botanical or synthetic. All pesticides are toxic to humans. Follow label instructions exactly. Do not apply more than is recommended. Wear protective clothing over all skin surfaces and unlined rubber gloves and boots, goggles and a respirator when mixing and applying pesticides.

Never apply powders or sprays on a breezy day when wind could cause the pesticide to drift. Drifting chemicals can damage non-target plants, birds, insects and you. If pesticides land on a person's skin or are inhaled or swallowed, they may cause immediate (acute) and/or long-term (chronic) health effects. Immediate reactions such as headaches, nausea, skin rashes or fever may occur. Chronic health effects may include damage to your organs, nervous system, immune system and reproductive system.

If you feel you've been exposed to pesticides, call your Poison Control Center immediately. In the Portland metropolitan area, call 494-8968. Elsewhere in Oregon call 1-800-452-7165.

Disposal

Buy only what you need and will use completely in one season so you won't need to worry about disposal or leftover material. When the label says "triple rinse the container," put the rinsate into your sprayer and use it according to label instructions. Never pour pesticides down the drain, into the sewer, into a septic system or onto the ground. Don't dispose of them in your trash.

If you must dispose of unwanted pesticides, take them to a hazardous waste disposal facility. Call Metro Recycling Information at 234-3000 for information about the facility nearest you. Always follow label directions for safely disposing of empty pesticide containers. Home-use pesticide containers are not recyclable.

Least-harmful strategies

Reducing reliance on pesticides requires that you rethink your strategy for controlling unwanted insects, weeds and diseases. When dealing with a problem, use the following approach: prevention, identification of the problem, physical or mechanical controls, biological controls, and ending, only when necessary, with the least toxic chemical control. The solutions suggested for the specific insects, diseases and weeds listed in this booklet follow this hierarchical approach.

Prevention

If you have a problem annually or are concerned the problem may develop, follow prevention recommendations such as those listed in this guide. Always apply the measures described in the previous "Healthy Yard and Garden Hints" section. Planting the right plant in the right place and giving good care are key.

Identify the problem

If you can't identify a particular pest or disease, collect a sample of it and take it to a local nursery or the OSU Extension office nearest you. An office is located in every county. Learn whether a particular insect is harmful or beneficial. Given a little time, natural predators may take care of harmful insects. Get to know what the predators of your destructive insect look like and, if possible, encourage them. For weeds, find out what soil, moisture and other conditions are causing them to grow and try to modify those conditions to discourage them. Remember that most plant problems stem from poor growing conditions rather than pests.

Physical controls

Once a problem is established, try physical removal, traps or barriers. This is the safest solution and can be extremely effective.

Biological controls

When appropriate, take advantage of the parasites, predators and bacteria nature provides to keep pest populations in check.

Thistles



Thistles have leaves with sharp prickles and spread by seed or underground shoots.

Prevention:

In flower or ornamental plant beds, use a deep organic mulch to reduce their numbers.

Physical control:

Pull them out and cover troublesome areas with weed barrier cloth. Spot treat with boiling water.

Quackgrass



Quackgrass forms dense spreading mats with white, fleshy roots.

Physical control:

Keep pulling it out. Pieces of root left in the soil can sprout new growth. Sift the soil carefully to make sure you remove all root pieces. Try covering it with weed barrier cloth. If mowed regularly, quackgrass does not seriously detract from the appearance of a lawn. Mowing will gradually cause quackgrass to decline.

Least-toxic chemical control:

Try spot treating with boiling water. If the grass still persists, do not spray. Paint the leaves when they are about 8 inches high with the least-toxic systemic herbicide available when the plant is actively feeding its roots. A systemic will move from the leaves through the plant's vascular system and kill the roots. Do not put plant parts that have been treated with herbicides into your compost pile.

Least-toxic chemical controls

If all else fails, use the least-toxic product appropriate for the problem. Be sure that the product you choose is labeled to treat the problem you have. Labels are changing as chemicals are being re-registered. IT IS AGAINST FEDERAL LAW TO USE A PESTICIDE IN A MANNER INCONSISTENT WITH LABEL DIRECTIONS. Focus applications on the affected foliage and apply only as often as is absolutely necessary. This will reduce negative effects on beneficial organisms such as earthworms, honeybees, dragonflies, spiders, ladybugs, praying mantis and birds. Be aware that even the mildest insecticidal sprays may kill beneficial insects that are also sensitive to it. The most selective methods are the best. Talk with knowledgeable nursery personnel or OSU Extension agents about timing and conditions for application of botanical products. Since they are short-lived, proper timing is critical.

Handle all pesticides with care and be especially sensitive to health and safety issues for yourself and the environment.



Insects

Ants



Actual size:
1/16"-1"

There are many species of ants found in homes and gardens in the Northwest. Ants do not directly harm plants, but if they are a nuisance, have your particular type identified by someone at a nursery or OSU Extension office. Also see the "Carpenter ants" listing.

Prevention:

Store food in tightly sealed containers. Keep all kitchen surfaces clean and free of food scraps and standing water.

Physical control:

If a line of ants is marching across the kitchen, find the point of entry and seal it. Use a silicone seal. Use petroleum jelly for a short-term fix until you have time to do a better job. Remove what the ants are eating and mop them up with soapy water. Some have found that sprinkling red chili pepper at the entry point helps discourage ants. Wrap a band of tape, paper or cotton coated with a sticky substance such as Tanglefoot® around the main stem of outdoor plants to trap ants.

Biological control:

Birds, bee flies, humpback flies and thick-headed flies are natural predators outdoors.

Least-toxic chemical control:

Diatomaceous earth, silica gel, boric acid and pyrethrum can be effective. Diatomaceous earth and silica gel are dusts that kill insects by drying them out. They are dangerous to breathe, so if they must be blown into wall spaces, a professional should do the job. Pyrethrum can be combined with silica gel to give a faster effect; one form comes in a non-aerosol

new growth sprouts can deplete the food reserves and allow other plants to compete successfully. Keeping all green parts removed from mid-summer to late fall will starve the roots and help control morning glory and other perennial weeds.

Least-toxic chemical control:

If chemical control is required, do not spray. Paint the leaves with the least-toxic systemic herbicide available when the plant is actively feeding its roots. A systemic will move from the leaves through the plant's vascular system to kill the roots. Do not put plant parts that have been treated with herbicides into your compost pile.

Moss



Moss is a natural part of the Pacific Northwest's native groundcover. If your lawn has moss, consider leaving it there or allowing it to spread in planting beds to form an attractive groundcover. It prefers shade, moisture, and poor acid soils.

Prevention:

Correct the conditions that encourage it to grow. Water infrequently but deeply, making sure that the water is penetrating and not running off. Proper aeration and thatching of lawns will help air flow. Do not apply water faster than the soil can absorb it. Soil should be limed and fertilized to encourage the growth of the desired plants or turf. If shade is from trees, consider pruning them to allow more sunlight to reach the area.

Physical control:

Rake it out of lawns.

Least-toxic chemical control:

Apply an herbicidal soap or an iron-based product that turns the moss black as it dies. Keep these products off concrete, as they will stain.

Horsetail rush



Horsetail rush is an ancient plant that can be attractive in natural settings, but easily becomes a pest in the garden. It spreads by spores or by its root system, which can be as deep as 12 feet. Its presence indicates that the soil is wet clay, tending to be acidic. Try drying out the area if possible. Or consider planting other water loving plants, like rushes and sedges, to add a more natural element to your landscape.

Physical control:

Hand pull or hoe out the above ground growth as it appears. Persistence is necessary, but over time, this will deplete its energy reserves and achieve control. When the weed dies down in winter, cover the area with weed barrier cloth and leave in place for two years to prevent weeds from photosynthesizing. Even then, roots may still be able to push up new growth.

Morning glory



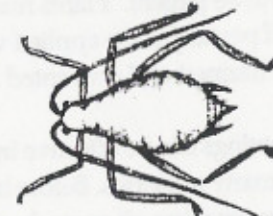
Morning glory is a weedy vine that will twine all over the garden, covering plants to the point of smothering them. It is usually spread by seed or invasive roots. Its thick fleshy roots can travel long distances just under the soil surface.

Physical control:

Hand weeding can remove large quantities of roots, but any broken pieces are capable of sprouting new growth. Never dispose of morning glory in your compost pile. Repeated, persistent digging or rototilling as the

squeeze dispenser that allows for application in cracks and crevices to minimize human and pet contact. Boric acid can be used in cracks, but only in areas not accessible to crawling children or pets. You can also use insecticidal soap to drench an ant colony outdoors or in a crawl space. More than one treatment may be necessary.

Aphids



Actual size:
1/8"

More than 4,000 species of aphids have been identified. There are black, brown, red, purple, pink, green and yellow aphids. Some have wings and others do not. They all have a soft body about 1/8 of an inch long and a soda-straw mouth part adapted for extracting plant juices. Because aphids bear live young, their populations grow rapidly. Late in the fall, males are born to fertilize overwintering eggs. These eggs, deposited in plant crevices and garden debris, withstand inclement weather to hatch in the spring. Most aphids excrete a sweet, sticky substance called honeydew as they feed. It serves as food for ants, bees and flies and as a growing medium for sooty mold.

Prevention:

Avoid planting species that attract aphids. These include birch trees, roses and certain vegetable varieties such as brussels sprouts. Consult your local Extension office or nursery for help choosing aphid-resistant plants. Also be sure that plants are healthy and have proper growing conditions. Weak or stressed plants are more susceptible to attack.

In the fall, get rid of all garden debris where aphid eggs can overwinter, and cultivate the garden soil 6 to 8 inches deep where possible.

Physical control:

For small infestations, hand pick and destroy the aphids. On sturdy plants, use a strong spray of water to wash them off. If ants are also present, follow the steps outlined in the "Ants" section.

Biological control:

Aphid predators include syrphid flies, green lacewing larvae and ladybugs (also called ladybird beetles). Chalcid and braconid wasps are aphid parasites. Parasite and predator populations often lag behind aphid populations, so there may be periods in the year, particularly in the spring, when the aphids appear to be out of control. Often the predators can catch up and restore control, but be patient. Plants may develop some damage but should outgrow it. If pesticides are applied when predator populations are present, they may be harmed and prevented from keeping aphids in check.

Ladybugs and lacewings can be effective in controlling aphids. They are available from many nurseries. Before introducing any predators, reduce aphid numbers by pinching off severely affected plant parts or hosing off most of the aphids. For best results with ladybugs, choose the right time of year and time of day to release them. Ladybugs are most active when the weather is warm, from April through September. Dusk is the best time of day to release them. Water the foliage where the aphids are feeding. The hungry and thirsty ladybugs will be attracted to the water-drenched foliage and find the aphids for food. They do have a tendency to disperse when released. Both the ladybug adult and larvae are predators. Green lacewing larvae are also effective predators of aphids and can be purchased and released.

Least-toxic chemical control:

Insecticidal soap sprays are often very effective in controlling aphids, although you may need repeat applications. Refer to Rodale's Garden Problem Solver for recipes for homemade sprays. Use rotenone, sabadilla or pyrethrum only as a last resort for severe infestations. A dormant oil spray applied in the winter may smother overwintering aphid eggs, but you may want to wait to take action until the problem reappears.

Prevention:

Clover in a lawn is usually the result of excess phosphorus or low nitrogen. Lawns need more nitrogen than either phosphorus or potassium. Since clover makes its own nitrogen, it is stimulated to grow in high phosphorus conditions. Fertilize with a nitrogen-phosphorus-potassium mix of 15-5-10 or 23-8-12, or use a nitrogen-rich organic fertilizer such as alfalfa meal or cottonseed meal. Do not over-fertilize; excess chemicals can run off and contaminate water.

Dandelion



Dandelions have a long thick tap root that stores food reserves. Dandelion seeds are dispersed by wind.

Prevention:

Minimize them by not allowing the flower to go to seed. Mow lawns often to keep the flowers from maturing. In flower or ornamental plant beds, use a deep organic mulch to reduce their numbers.

Physical control:

Hand dig them out, removing as much of the root as possible. Spot treating with boiling water is an effective control, especially when you pull the weed first and treat the root. In lawns, removing dandelions leaves small bare areas where new weed seed can germinate. Spread a little grass seed in those spots to prevent weeds from establishing.

Weeds

What is a weed?

A plant whose virtues have not yet been discovered.

– Ralph Waldo Emerson

Bittercress



This member of the mustard family has a circle of leaves at its base and produces 6 to 8-inch stems with white flowers. The flowers mature into inch-long seeds that pop off when disturbed. This plant is prolific only in the spring; by summer, it should be no problem.

Prevention:

In flower or ornamental plant beds, use a deep organic mulch to reduce their numbers.

Physical control:

In late February, before the flowers go to seed, manually pull them or hoe them. If you manually remove them early in the season as soon as they start to grow, the seeds won't spread and increase the problem.

Clover



Clover comes in many varieties, all three-leafed and low-lying. Clover spreads by sending out shoots.

Apple maggots



Actual size:

Adult 1/4" Maggot 1/4"

This pest makes brown tunnels inside apples with external symptoms so slight they may go unnoticed. The adult apple maggot is a fly, similar to the common housefly. Flies lay their eggs in the apples, and the legless white maggots develop in the flesh of the fruit. The insect spends the winter in the soil in its pupal stage.

Physical control:

Collect dropped apples to reduce the apple maggot population. If not too badly damaged, these apples can be made into cider.

Trap adult flies with a solution of one part blackstrap molasses or malt extract, nine parts water and enough yeast to create fermentation. Once the fermentation subsides, pour the liquid into wide-mouthed jars, coffee cans or milk cartons. Hang the containers in the trees as traps.

Another effective trap is a red plastic sphere, made sticky by applying a commercially available sticky compound such as Tanglefoot®, hung in trees to trap the insects when they land. These traps are available at garden centers or can be made at home.

If apple maggots are a consistent problem, consider planting thicker-skinned later varieties such as Winesap and Jonathan.

Biological control:

Pheromone traps, available at garden centers, attract apple maggot flies. The flies are drawn to the scent and are caught on the trap's sticky surface.

Box elder bugs



Actual size:
1/2"

These bugs feed on the seeds of box elder, maple and ash trees. Full-grown box elder bugs are about 1/2-inch long with reddish brown body and three lengthwise red lines, one down the center and one on each side. The young are bright red. After feeding on plants in your yard during the summer, box elder bugs may enter your house for a warm place to winter. However, they will not feed on anything and will not cause damage.

Physical control:

For smaller infestations, try hand picking the bugs. Reduce their numbers by removing nearby unwanted female box elder trees (they produce the seeds). Inside, sweep them up and dispose of them. If you use a vacuum, dispose of the bag so bugs can't crawl back out once the vacuum is stored away or place the bag in the freezer for a few days to kill the bugs. Also, seal cracks in exterior walls and around windows. Look for box elder bugs in warm, sunny places in spring, such as on the south side of a house. They tend to congregate under such conditions and can be vacuumed up with little effort.

Least-toxic chemical control:

Spray trees with insecticidal soap or summer oil when pests appear. However, don't use this approach on Japanese maples, as it may damage foliage.

Termites (damp wood)



Actual size:
3/4" - 1"

These termites land on your house, shed their wings and try to find a home. They will die if they cannot find damp wood.

Prevention:

Do not leave soil piled up next to your house or in contact with any wood structures. Also, repair any leaky pipes that keep surrounding wood moist. Firewood should be stored in a dry place; wet wood attracts termites.

Wasps and yellow jackets



Actual size:
1/2" - 3/4"

Wasps and yellow jackets are beneficial. They eat other insects. If they become a nuisance, use traps specifically designed to capture the type of pest you have. Consult a knowledgeable nurseryperson for advice on which one to use. Place traps away from high-use areas.

Prevention:

Cover garbage cans and outdoor foods, especially fruit and other sweets.

Tent caterpillars



Actual size:
Up to 3"

These caterpillars spin the silky white tents that cover the tips of branches. They damage plants by eating foliage as it emerges. They eat leaves off many deciduous trees and shrubs, especially walnut, alder, willow, fruit trees and roses. If a tent has been on a branch for awhile, chances are some caterpillars are full-grown (up to 3 inches) and have left the tent to select a site to spin cocoons. After about two weeks, adult moths emerge, mate, lay eggs and die. The eggs are laid in a foam-like band around small twigs or branches of the host tree where they hibernate over the winter. When new leaves begin to appear in the spring, the eggs hatch.

Physical control:

Consider tolerating a few tents. These caterpillars are native insects and are controlled in the long-term by natural factors. Prune out branches containing tents in particularly valued trees or those with heavy infestations. Prune early in the morning or in the evening when caterpillars are in their tents. Put tents in a sealed paper bag in the garbage. During the winter, examine branches and rub off egg masses that appear as gray or brown frothy material, hardened and somewhat similar to Styrofoam. Egg masses are usually 1/2-inch long bands surrounding twigs. Deposit in a bag, seal it and place it in the trash.

Biological control:

Tachinid flies deposit white eggs, natural parasites, in visible rows on the caterpillars' backs. If you look closely at the caterpillars and see these eggs, natural controls are working. You can introduce the bacterium BT (*Bacillus thuringiensis*), but to be effective, it must be sprayed to thoroughly coat the leaves since BT is a stomach poison effective only when ingested. BT will kill all caterpillars, including those that mature into desirable butterflies. If you use BT, use it only on the affected plant and follow label directions.

Carpenter ants



Actual size:
1/4" - 1"

Unlike termites, carpenter ants don't actually eat wood. They nest in it. If you find them in your house, look for a good professional who understands your concerns about toxic chemicals and will work with you to select a least-toxic control program. While they can cause serious damage to houses, these ants are actually beneficial insects in the forest, where their excavations help speed the decomposition of dead trees. In fact, they prefer to build their nests in decayed or rotted wood, but will eventually extend their tunneling into sound wood if they can't find decayed wood.

Positive identification requires collecting a few of the largest ants and inspecting them under a magnifying glass. Carpenter ants have a smooth upper back, while most other ants have a dip in this area. Suspicious signs include sawdust and debris, rustling sounds in the walls and trails of ants between the foundation and wood outside the home.

Carpenter ants eat dead insects, honeydew exuded from aphids, plant juices and sweet or fatty foods in the home. To assess the extent of the problem, locate the main colony. Seventy-five percent of all main nests are located outside the house where there is abundant moisture, such as in an old tree or tree stump above or below the soil surface. Satellite nests may be found inside your house, in walls and ceilings, under outdoor siding, near downspouts or roof gutters, in floors – particularly bathrooms – or in insulation. Begin with the basement and work up to the attic, looking for the ants and sawdust-like wood shavings.

Prevention:

Remedy whatever attracts them to your house in the first place. Repair any rotten or weather-damaged wood and make sure that attic and crawl space ventilation is adequate. Inspect gutters and downspouts to be sure they do not leak and that water is being diverted away from the house. Clean out the gutters. Remove any wood in contact with soil at any part of

the house, porch, deck, etc. Firewood should not be piled against the side of the house. It should be elevated off the ground and kept away from the house. Trees and shrubs should be pruned back so that they do not touch the house or garage, including roofs. Stumps should be completely removed. Even decorative bark may harbor carpenter ants and provide nesting sites.

Physical control:

Locate and remove all nests, capture stray ants, caulk access points and replace all damaged wood. This sounds like a tall order, but if the infestation is accessible and has not spread too far, you can be successful.

Least-toxic chemical control:

Use desiccating dusts, such as diatomaceous earth or silica aerogel. Boric acid is a powder that can be blown into wall voids. Pyrethrum is also effective.

Carpet beetles



Actual size:
3/8" - 1/4"

This small beetle eats articles made of natural fibers, like wool sweaters and cotton or linen apparel. They leave an unmistakable calling card: their shed skins in the bottom of drawers and holes in articles stored there.

Prevention:

Store items in a clean condition; beetle larvae are attracted to soiled areas, especially food stains. Sachets made from rosemary, mint, thyme and cloves help repel these pests. Check cut flowers for adult carpet beetles before you bring them into the house.

Least-toxic chemical control:

If you discover beetles inside the house, apply boric acid to the areas in which you find them.

Spiders



Actual size:
1/16" - 3/4"

Spiders are beneficial predators that consume many destructive insects. There are many types, but only black widow spiders and certain funnel web spiders pose any threat to humans in our area. Funnel spiders make a sheet web with a funnel-tube at one end. They wait inside the tube and dash out to bite any prey that becomes entangled in the web. They can grow to 3/4 inches long and may bite intruders with little provocation. Bites are touch sensitive and cause a severe headache in the first several hours following the bite. Bites can be serious and should be treated.

Prevention:

Cover outside woodpiles with plastic to make them less attractive to spiders. Avoid areas where spiders congregate.

Physical control:

The best way to get rid of a spider in your home is to place a glass jar over it, slip a card underneath and carry it outside. They are fragile and will usually be killed by sweeping with a broom. Spraying with a pesticide is usually pointless because woodpiles and similar areas are so attractive to spiders that they usually return.

Spider mites



Actual size:

1/4"

Spider mites are found on a wide variety of plants. If the leaves start to look pale or mottled, it may be from mites sucking the juices. They are almost too small to see, but can be identified by tapping a suspect leaf over a sheet of white paper. If the little spots move, it's likely they are mites. You may also be able to see webbing on the back of the leaf or between leaves. Spider mites especially like dry conditions. If spider mites have been a problem on your house plants, try raising the humidity around the plants by misting them regularly or setting bowls of water among them.

Physical control:

Wash spider mites off with a strong stream of water. You will need to repeat this every several days, and be sure to spray all sides of the leaves thoroughly.

Biological control:

Predatory mites, available from nurseries, prey on all types of harmful mites but are most effective in greenhouses. Ladybugs, praying mantis and lacewing larvae also eat mites.

Least-toxic chemical control:

Try an insecticidal soap, which is effective when sprayed directly on the mite. Repeated applications may be necessary. Pyrethrum, sabadilla or horticultural oil are also effective. Use dormant oils only in winter. Don't use summer oils when the plant is flowering.

Clothing moths



Actual size:

Wingspan 3/8" - 1 1/8"

These moths are very small, no longer than 1/2-inch long. They like to settle in dark places like stored clothing or under furniture slipcovers, where they leave their eggs. The eggs hatch into larvae, which feed on anything containing wool, fur or feathers. They will also eat other fabrics if dirty and blended with wool. They are primarily attracted to dirt, lint, salt, stains, moisture and dead insects.

Prevention:

Clean any used clothing or furniture you purchase before bringing them inside. Keep stored clothes and furniture clean and dry. Minimize humidity with good ventilation and controlling moisture sources.

Physical controls:

Vacuum rugs, furniture and closets frequently. Clean out drawers used to store clothing. Store clothes in airtight containers or bags sealed with tape. While cedar and natural sachets smell wonderful, they are not effective at repelling moths. Shake out or brush clothing you wear infrequently to destroy any larvae present. Expose to air and sunlight. Placing clothing items in the freezer for several days will kill clothing moth adults and larvae.

Cockroaches



Actual size:

1/2" - 5/8"

These 6-legged, hard-bodied insects can carry disease, contaminate food and induce allergies. They hide in cracks and crevices during the day

and feed at night on water and food crumbs, even wallpaper paste or envelope glue. They prefer warm, moist areas such as kitchens, bathrooms and around washing machines and hot water heaters.

Prevention:

Cleanliness is crucial. Properly store and dispose of all kitchen wastes. Keep the kitchen clean and free of food scraps. Wash dishes immediately after eating. Keep areas where grease accumulates clean. Wash pastry cloths. Do not leave pet food or water bowls out at night. Enclose food in sealed containers. Fix dripping faucets and other leaks and make sure your dish rack drains properly. Damp, dirty mops can also attract roaches. Sweep frequently.

Physical control:

If you find a cockroach nest, wash and vacuum the area if it is accessible. Plug cracks around baseboards, cupboards, pipes, sinks and water heaters with latex or silicone caulk. Move debris, firewood and garbage away from the house.

Least-toxic chemical control:

Use boric acid, but keep it away from areas children or pets may explore. It is particularly useful under the stove and refrigerator or in cracks that cannot easily be plugged. Use roach traps that contain boric acid to monitor the effectiveness of your prevention and control measures.

Codling moths



Actual size:
Moth wingspan 3/4" Larva 1"

Codling moths emerge in the spring and lay eggs that hatch into larvae that pupate during late summer and fall. Codling moth larvae are a unique white color tinged pink with a brown head. They tunnel directly to the core of fruit, usually apples or pears.

Physical control:

Do a "search and destroy" mission by patrolling your yard at night with a flashlight and killing the slugs you find. You can cut them in two with scissors, spray them with a mixture of one part ammonia in three parts water, or drop them into a bucket of soapy water.

Recent research suggests that sheet copper buried in the soil to create a fence several inches high is very effective barrier. Other barriers, applied as a ring around the base of plants or around the entire garden, include diatomaceous earth, wood ashes, sharp sand and crumbled egg or oyster shells. These may be effective only under dry conditions.

A container of beer, buried so that the rim is slightly above ground level, attracts and drowns slugs. There are also several slug traps available at garden centers that attract slugs into them and then prevent them from getting out. You can also make one by simply turning over a wet clay pot in a shady area of the garden. Create a gap for them to crawl through by resting the edge of the pot on a twig or on some irregularity in the ground. The slugs will collect under the pot during the warmest part of the day. Check for slugs and destroy them.

Sod webworms



Actual size:
Moth wingspan 1/2" - 1 1/2"
Larva 1/2"

The larvae of this lawn moth feeds on the shoot and crown of the grass, but not the roots. Irregular brown patches appear on the turf and the grass dies back, leaving irregularly sized dead areas. The larvae are slender, gray, with a brown head and are about 1/2-inch long. They can be seen when the brown or dead sod is lifted.

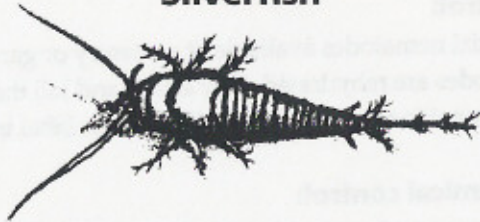
Biological control:

Beneficial nematodes are effective when applied according to package directions.

Least-toxic chemical control:

Use insecticidal soap spray in early summer on the crawler stage. Do not use oil sprays when the plant is flowering. Apply dormant oil spray only in the winter, or it may defoliate your plant.

Silverfish



Actual size:
3/8" - 1/2"

Silverfish are attracted to carbohydrate substances such as the glue on the back of wallpaper or in the spine of books. They can be a problem in boxes where books are stored. They are attracted to dark, damp areas.

Least-toxic chemical control:

Boric acid can be applied on inside carpets and applied in hard-to-reach cracks using spray or powder in a duster bottle with a needle-nose applicator. Never use in areas where crawling children or pets may have contact.

Slugs



Actual size:
1/8" - 5"

Slugs feed at night and prefer moist plant material. They eat many types of vegetables, fruits and flowers. Some of their favorites are strawberries, lettuce, spinach, carrot tops, dahlias and marigolds.

Prevention:

Remove garden debris, boards, bricks and tall grass where they may hide during the day.

Physical control:

Wrap bands of burlap or corrugated cardboard around tree trunks just after bloom, before caterpillars begin to move down the tree (late spring) and maintain them through fall. This draws larvae looking for a place to pupate. Use several thicknesses and wire or tie them on. The corrugated cardboard ridges should be 3/16-inch wide and face toward the tree with the ridges running vertically. Remove the bands once a week in warm weather (every two weeks in cooler weather) and kill the larvae. Continue until you have harvested all the fruit. Even in the best situations, banding will control only a small percentage of codling moths because many pupate elsewhere in the tree or drop to the ground, bypassing the trunk.

Scrape away loose bark and destroy overwintering cocoons before warm spring weather.

Biological control:

Garden centers carry pheromone traps that attract the male moths and kill them. Trichogramma wasps and braconid wasp larvae are natural parasites of moths. These wasps are available through various mail-order companies. You can attract parasitic insects by growing sweet alyssum or daisies nearby to provide a good nectar source.

BT (*Bacillus thuringiensis*) has been used with some success to help control codling moths. However, to be effective, applications must be frequent and carefully timed to reach the larvae just as they hatch.

Least-toxic chemical control:

Horticultural oil spray may be applied as eggs are laid and before they hatch. Spray dormant oil in the winter before trees bud out.

Crane fly larvae (European)



Actual size:

Larvae 1" - 1 1/2"

The European crane fly is a recent arrival in Oregon and looks much like the variety commonly found here. Adult crane flies look like giant mosquitoes, and are sometimes called mosquito hawks or mosquito eaters. The common variety is harmless and usually found around marsh areas. Crane fly larvae or grubs are worm-like insects up to 1 1/2 inches long that live in the soil and destroy grass roots, crowns and shoots, leaving brown patches in the lawn.

Prevention:

Crane flies are attracted to soggy areas of your lawn, so minimize watering and/or improve drainage.

Physical control:

Begin monitoring for larvae in early spring. Shorten the grass in one square foot patches in several places around your yard. Pour warm water mixed with a little soap (not detergent) on the patch, and count the grubs that emerge. If levels are above 25 grubs per square foot, treatment may be appropriate. Consult with OSU Extension for treatment options. A warm, dry fall may reduce the number of larvae because of their sensitivity to dryness.

Research in Colorado has shown that aerator shoes that strap onto your feet can be used to control grubs. The long spikes on the bottom of the aerator shoes pierce the grubs as you walk over the infected sod. Also, thatching or aerating the lawn can reduce populations. Do these treatments on a cool, moist day when grubs are at the surface.

More than 100 species of birds are known to feed on crane fly larvae. Crane fly larvae are among starlings' favorite foods.

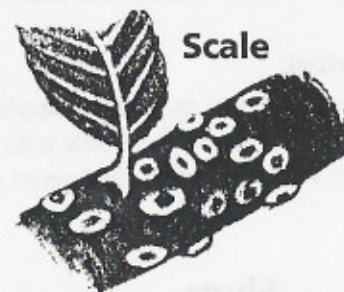
reduce their hiding places. You can apply a collar with a band of a sticky substance such as Tanglefoot® around the base of the trunk to trap them and prevent them from reaching their food source. Handpicking the adults at night is an effective control method.

Biological control:

Use beneficial nematodes available at a nursery or garden center. When the nematodes are rehydrated, they attack and kill the root weevil larvae. This treatment is effective in early fall. Follow label instructions.

Least-toxic chemical control:

Use Neem to control adults in early summer. Applying diatomaceous earth around plants may help in dry weather. Wear nose and mouth protection when applying, and keep pets away from the area.



Scale

Actual size:

Adult female 1/100" - 1/10"

There are many varieties of scale, which suck plant sap, weakening plants and causing leaves to yellow and drop. Some excrete large quantities of honeydew. There are two to four larval stages. The first looks like a mite, and subsequent stages look like smaller versions of the adult females. Adult females look like hard or soft bumps on stems, leaves and fruit. Males, minute flying insects with yellow wings, do not feed.

Physical control:

For small infestations, hand picking or dabbing scale with rubbing alcohol is effective. Prune and dispose of infested branches and twigs.

Biological control:

Encourage predators such as aphid lions (green lacewing larvae), syrphid fly larvae, ladybugs (adults and larvae) and parasitic wasps.

The larval stage is a caterpillar that folds the leaf and webs it, then feeds inside it.

Physical control:

Remove them or the leaves they are in from the plant. Do not put them in your compost bin unless you bury the leaves in the deepest, hottest part. It is better to put them in a sealed paper bag and place in the garbage.

Biological control:

Encourage native parasitic wasps such as *Trichogramma*. BT (*Bacillus thuringiensis*), the bacterium that paralyzes the digestive system of the pest, may be used according to label directions, however it is difficult to deliver to the areas where the larvae are feeding. The rolled leaves provide good protection.

Least-toxic chemical control:

Dust or spray with pyrethrum or rotenone for severe infestations only. Apply in two applications, 30 minutes apart. The first drives the caterpillars from hiding, the second kills them.

Root weevils



Actual size:
Adults 1/4"

Root weevils commonly infest the root systems of ornamental shrubs like azalea, primrose, blueberry and rhododendron.

Larvae live in the ground around the base of the plant and chew on the bark and the surrounding surface roots primarily during the fall and winter months. Adult root weevils are nocturnal feeders, notching the edges of the leaves, and are most active from late spring through summer.

Physical control:

Prune any branches that are touching the ground to prevent adults from crawling up them to feed. Rake any mulch away from the stem to

Biological control:

Beneficial nematodes are effective when applied to the sod according to package directions. Use it once soil temperature rises above 55 degrees, usually in late spring, when the crane fly is in its larval stage.

Cutworms



Actual size:
Adult 1 1/2" wingspan
Caterpillar 1" - 2"

Cutworms are gray or brownish caterpillars that curl up when disturbed. They feed at night and hide in the soil during the day. Eggs are laid in the soil, and the larvae or pupae overwinter in the soil. A sure sign of cutworms is sliced-off stems of seedlings at soil level.

Physical control:

Protect individual seedlings with a 3-inch collar made from stiff paper or plastic pressed 1 inch into the ground. Toilet paper tubes work well. Spread cornmeal or molasses near the base of each plant. Cornmeal wells up inside worms when they eat it, killing them. Molasses immobilizes them, but is effective only during dry weather.

Biological control:

Beneficial nematodes or BT (*Bacillus thuringiensis*) can be used. Follow package directions and apply under recommended conditions. BT is most effective with younger, smaller cutworms.

Earwigs



Actual size:
3/8" - 5/8"

Earwigs are brown, beetle-like insects distinguished by a pair of long pincers at the tail end. Earwigs are scavengers of decaying matter and

predators of insect larvae, snails and other slow-moving bugs. They are nocturnal feeders, spending the day under bark, stones and garden trash. They occasionally feed on foliage, flowers and other parts of many plants, including dahlias, zinnias, corn, hollyhock, lettuce, strawberry, celery, potatoes, seedling beans and beets. They usually come into the house only as transients and won't stay unless there is plant material for them to eat.

Physical control:

Set sections of bamboo or damp, rolled up newspapers horizontally through the garden or flower beds. Check the traps early each morning and dump the insects into a bucket of soapy water. Empty tuna cans containing 1/2-inch of vegetable oil also attract and drown earwigs.

Elm Leaf Beetles



Actual size:
1/4"

Elm leaf beetles are generally found on the Big American, Siberian and Chinese elm trees and on zelkova, occasionally planted in place of elm. In spring, the adults lay eggs on the leaves. When the eggs hatch, the immature beetles eat all the fleshy parts of the leaf, leaving only the skeleton or veins. After a month or so, they are ready to pupate into the cocoon stage and descend to the base of the elm. They are about a quarter of an inch long, and usually yellowish or golden in color with black markings.

Physical control:

Because the pupae are visible on the ground around the tree, you can destroy them by simply smashing them. The elm leaf beetle can produce as many as three generations in the summer, which can seriously weaken the tree.

After feeding on plants in your yard during the summer, beetles try to enter your house during the fall for a warm place to winter. However, they do not feed on anything and will not damage your home. Sweep them up and dispose of them. If you use a vacuum, dispose of the bag so they cannot

Indian meal moths



Actual size:
Wingspan 5/8"

Indian meal moth larvae are generally brought home in purchased food such as cereal, flour, oatmeal, trail mix, etc. The larvae may stay in the food, feeding on it until January or so. When it emerges, it seeks out the warmest place which, in your house, is the ceiling. If you miss seeing them in their pupae stage, you probably won't miss the adult moth fluttering around in your house.

Prevention:

Never leave opened packages of food in your pantry. Always store food in sealed containers. If you have a problem with a particular dry good, store it in the freezer. This also kills the eggs in food that is already infested.

Physical control:

The best solution is to check your dry goods and find the container where the moth has laid its eggs and larvae have hatched. As the larvae feed, they make webs that look like spider web strands tangled up in the infested food. Put the infested food in a sealed paper bag and dispose. Pheromone traps for catching Indian meal moth adults are available commercially.

Leaf rollers



Actual size:
Moth 3/4"
Larva up to 1"

There are many types of leaf rollers that infest many different plants, including apple, willow and plum trees, blueberries, Photinia and laurel.

type, the cluster fly, is not associated with garbage or manure. It is larger and darker than the housefly, is a sluggish flier and often found in clusters on windowsills in winter.

Prevention:

The key is to prevent odors. Properly store and dispose of all kitchen wastes. Keep the kitchen clean and free of food scraps and overripe fruit. Wash dishes immediately after eating and keep drains fresh with baking soda and vinegar, followed with hot water. Rinse recyclable cans and bottles before storing. Bury or dispose of pet feces. Install properly fitting screens on windows and doors and keep them in good repair.

Physical control:

The best way to dispense with a fly is the old-fashioned way, with a fly swatter. You can also try rolls of sticky flypaper, particularly in garages, near garbage cans and other areas where appearance is not important. These methods should control cluster flies, but will be inadequate for controlling the other types of flies unless proper sanitation practices are followed. Try a saucer of red wine for attracting and drowning fruit flies.

Ultraviolet light and electrocution traps are not recommended for outside use because they kill as many beneficial insects as they do flies. Chemical insecticides, including impregnated hanging strips, are not recommended as they pose risks to human health and should not be needed if the source of the problem is addressed.

Honeybee swarm



Actual size:
3/8" - 5/8"

The best way to remove a swarm of bees is to call a reputable bee keeper who can, in 20 to 30 minutes, capture the queen bee. The rest of the swarm will follow. Bees in a swarm are engorged with honey and pose very little stinging threat.

escape after the vacuum is stored away or place the bag in the freezer for several days to kill the beetles.

Biological control:

Check with your nursery for a specific variety of BT (*Bacillus thuringiensis* var. *san diego*) that attacks beetle larvae. Tachinid flies and chalcid wasps are effective enemies of elm leaf beetles.

Least-toxic chemical control:

Summer oil can control elm leaf beetle eggs and can be applied in the spring.

Fleas



Actual size:
Adult fleas - 1/16"

Fleas are a common pest west of the Cascades where winters are mild and homes are relatively damp. They inflict annoying bites, transmit tapeworms and can cause allergies in both animals and humans. Fleas are almost impossible to eradicate. You may kill most of the adults, but new eggs or larvae are waiting to carry on, and your pet will bring in more fleas from outside. Don't dismay . . . you can keep the flea population low enough that they don't bother anyone, and you can do it without using highly toxic products.

Decide at what level a flea problem becomes unacceptable to you. This may be one flea bite per week or finding two fleas each time you comb your pet. When they reach an unacceptable level, apply control measures starting with the physical ones. At any time, fleas may exist in all four life-cycle stages (egg, larva, pupa and adult) in your home. Follow these recommendations closely and use chemical controls only if necessary.

Physical control:

Establish one regular sleeping area for your pet in a place you can clean easily and regularly. This is easier for dogs than for cats. With cats,

you may have to place removable cloths in several places where they like to sleep. Any bedding materials and nearby rugs should be removed frequently and washed. Vacuum all areas to which your pets have access every week with a strong canister-type machine. Use a crevice tool and don't forget the upholstered furniture. During the "flea season" in the late summer and fall, you may need to vacuum more often – every third day or so. Dispose of the vacuum bag immediately so that the fleas cannot escape after the vacuum is stored away.

Severe flea outbreaks may require shampooing or steam cleaning rugs and upholstered furniture. Restrict your pets to certain rooms in the house. Do not allow them in bedrooms, hard-to-clean rooms such as basements and attics, or rooms belonging to family members particularly susceptible to flea bites. In severe cases, keep animals either outside or inside, but don't let them go back and forth. Small areas outside where your pet spends a lot of time (concrete areas, dog houses, garages or decks) can be kept relatively free of fleas by vacuuming. However, it is better to focus your efforts indoors where you have more control.

To remove adult fleas from pets, comb them with a flea comb and bathe them. A flea comb has specially designed tines spaced to allow hair, but not fleas, to pass through. Several tine spacings are available. As you run the comb through your pet's fur, some fleas will jump away, but others will stay on the comb. Remove the fleas from the comb and drop them into a container of soapy water. When finished, flush them down the toilet. Count the fleas removed to estimate the flea population and monitor the need for other controls. Shampooing an animal knocks some fleas off and drowns others. Ordinary soap or shampoo work to a degree, but an insecticidal shampoo is more effective. Keep the soap away from the pet's eyes and discontinue any product that produces skin irritation or allergies.

Least-toxic chemical control:

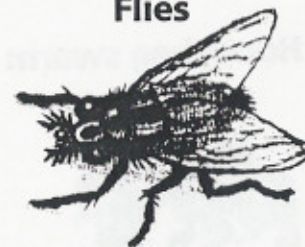
Flea collars are not recommended because they contain very potent chemicals that may harm your pet. The safest chemical for killing fleas is an insecticidal soap. Separate soaps can be purchased for treating the pet and its surroundings. There are also insecticidal soap sprays available for inside/outside use in which a small amount of pyrethrum is added to the soap. Many other pyrethrum-based products are available. Cats are especially sensitive to pyrethrum, so if your cat does not tolerate it, try something else.

After soaps, the safest chemicals to kill adult fleas are the natural constituents of lemon peel oil, which are quite toxic to adult fleas and relatively safe to vertebrates. Use shampoos or area sprays which contain linalool. Do not substitute these products for a year-round program of non-chemical control.

Methoprene, an insect growth regulator, mimics natural insect hormones and prevents immature fleas from becoming adults. It is quite specific to the target insect and is fairly safe to mammals. However, it does not kill adult fleas or eggs, so it must be used in combination with other controls. It is more effective when flea populations are just beginning to build, but you may not know that the problem is going to be serious enough to need chemical treatment. Methoprene is available in aerosol foggers and a concentrate. Foggers are not recommended because they do not concentrate the application in the areas where adults and larvae hide (carpets, bedding, etc.) and often contain other toxic ingredients. Spray the concentrate as directed.

Boric acid can be applied on inside carpets and diatomaceous earth can be spread over lawns. These materials kill fleas by drying them out instead of poisoning them, but are dangerous to humans, especially young children, if inhaled or absorbed through a cut in the skin. Wear rubber gloves and breathing protection when applying these yourself or have them applied by professionals. Avoid these methods if you have young children.

Flies



Actual size:
1/8" - 1/4"

There are many different types of flies, but there are only about four kinds that are found indoors and are considered house pests. The common house fly is gray and about 1/4-inch long. It breeds in garbage cans, dumpsters, compost piles or other sources of food waste. It can pose a health hazard because it carries disease organisms. The drain fly is somewhat smaller and breeds in sewage and kitchen drains. The tiny yellow-brown fruit fly hovers over fruits and vegetables in the kitchen. The fourth