

# A Guide to Organic Pest Management Practices

Choose a pest and learn about the best management practices and avoid the use of illegal, synthetic pesticides.

Distributed by the City of Portland Sustainability Office - Pesticide Management Advisory Council

Learn more about the City of Portland Pesticide Use Ordinance: [portlandmaine.gov/pesticides](http://portlandmaine.gov/pesticides)



PEST TYPE	PEST	BIOLOGICAL CONTROLS	NON-CHEMICAL AND MECHANICAL CONTROLS	LEAST TOXIC CHEMICAL OPTION AS LAST RESORT
Animal	Deer	None	1) Repair holes, 2) Create a barrier, 3) Fencing, 4) Mesh screens.	Caution: Most deer chemical repellants should not be allowed on food crops. 1) Deer repellents based on ammonium salts of fatty acids 2) Capsaicin-based animal repellent, 3) Dried blood or animal renderings used as a repellent. Caution: these materials must come only from American cattle to avoid risk of infectious disease.
Animal	Gophers	Predators such as owls, snakes, cats, dogs, coyotes eat pocket gophers.	1) Create a barrier, 2) Remove burrow and habitat. 3) Trapping.	None
Animal	Squirrels-Tree	None	1) Repair holes, 2) Create a barrier, 3) Fencing, 4) Mesh screens like hardware cloth, 5) Remove trash from property, 6) Remove clutter, 7) Remove debris and habitat.	1) Capsaicin-based animal repellent, 2) Cayenne pepper.
Animal	Rats	None	1) Use metal trash cans, never plastic, 2) Remove food source (such as pet food), 3) Remove debris/trash, 4) Repair holes/seal cracks, 5) Trapping.	Vitamin D3-based rodenticides
Insect	Ants	None	1) Seal cracks and crevices, 2) Repair holes, 3) Create barriers, 4) Sticky traps, 5) Remove trash from property, 6) Remove clutter, 7) Vacuum, 8) Boiling water, 9) Remove debris and habitat.	1) Botanical sprays such as cinnamon oil, mint oil, cedar oil, orange oil. Garlic spray can be used as a repellent. 2) Desiccating dust such as diatomaceous earth, 3) Corn meal.
Insect	Aphids	Lady beetles	1) Create a barrier, 2) Sticky traps, 3) Unusually a strong spray of water, 4) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Usually a strong spray of water or soapy water can be a solution. Soapy water spray consist of: 1 heavy tablespoon of bio-degradeable dish soap to 1 quart (1 liter) of water, 2) Insecticidal soaps such as horticultural oils such as neem oil can be toxic to good insects. Note: Homemade insecticidal soap is 1 heavy tablespoon of bio-degradable dish soap to 1 quart (1 liter) of water.
Insect	Bagworms	1) Bacillus Thuringiensis, least toxic bacterium, 2) Nematodes (Steinernema carpocapse).	1) Remove debris and habitat, 2) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Neem oil and insecticidal soaps are effective against young bagworm larvae however, can have adverse affects on other beneficial insects. Note: Homemade insecticidal soap is 1 heavy tablespoon of bio-degradable dish soap to 1 quart (1 liter) of water.
Insect	Browntail Moth	None	1) Clipping the overwintering webs and destroying these webs by either soaking in soapy water or burning them. This control should be undertaken in the winter and very early spring - September to mid-April. 2) Cocoons or caterpillars crawling on buildings can be removed with water from a high pressure hose.	Webs and larvae are generally high up in trees and are difficult for a home owner to effectively control. Seek professional help from an arborist who is a licensed organic pesticide applicator if considering pesticide control. Pesticides should be applied when caterpillars are small and feeding; usually before the end of May. Timing of pesticide treatment is critical, treatment before the end of May will prevent the development of the toxic hairs, treatment after the end of May will result in dead caterpillars and toxic hairs. Undertake control measures as early as possible to reduce the exposure to the irritating caterpillar hairs. Contact a licensed pesticide applicator well before May to plan a control strategy. Note: A licensed pesticide applicator is required for applications of non-biological insecticides to control browntail moth within the 250 feet of the high tide mark.
Insect	Chiggers	None	1) Remove water source: check drains, faucets, and pipes, 2) Remove trash from property, 3) Remove clutter, 4) Remove debris and habitat, 5) After being exposed, shower with warm soapy water. 6) Wash clothing in 125F or hotter.	Direct, chemical control of chiggers is not practical.
Insect	Chinch Bugs	Bigeyed bugs (Geocoris, sp.)	1) Aerate soil, 2) Proper watering, 3) Dethatching, 4) Proper fertilizing of lawn, 5) Add agricultural limestone when soil PH is below 6.5, 6) Spray soapy water.	1) Insecticidal soap, Note: Homemade insecticidal soap is 1 heavy tablespoon of bio-degradable dish soap to 1 quart (1 liter) of water., 2) Diatomaceous earth. (Be sure to purchase food grade).
Insect	Cutworms	1) Nematodes, 2) Bacillus thuringiensis, var. kurstaki, 3)Tachinid fly, 4) Wild birds	1) Protect seedlings with collar, 2) Handpick	Diatomaceous earth
Insect	Emerald Ash Borer	Encourage biodiversity such as woodpeckers.	1) Remove debris and habitat, 2) Handpick to root and destroy, for example, enclosing in a trashbag.	Azadirachtin- derived from neem oil but can still harm bees.
Insect	Fire Ants	None	1) Flame treatment, 2) Boiling water, 3) Aerate soil, 4) Remove debris and habitat.	Boric acid bathing system
Insect	Fleas	Nematods	1) Seal Cracks and crevices, 2) Repair Holes, 3) Remove water source: Check drains, faucets, and pipes, 4) Remove standing water, 5) Vacuum, 6) Steam treatment, 7) Sanitation- use soap and water to clean surfaces, 8) Restrict pets to as single bed, 9) Groom pet daily with flea comb, 10) Give pet Vitamin B1.	1) Diatomaceous earth, 2) Boric acid, 3) D-limonene and linalool (citrus acids).
Insect	Grubs, including European Chafer, Japanese Beetle, June Beetle, etc.	1) Nematods, 2) Bacillus thuringiensis, var. galleriae during both beetle and grub stages	1) Mow lawn above 3 inches, 2) Aerate soil, 3) Proper watering, 4) Dethatching, 5) Setting mechanical traps.	None
Insect	Gypsy Moths	1) Natural predators such as: birds, spiders, beetles, flies, and wasps, 2) Bacillus thuringiensis, var. kurstaki	1) Sticky traps, 2) Handpick and destroy, for example, enclosing in a trash bag.	1) Spray egg masses with dormant oils or vegetable based Horticultural oils, or homemade which is vegetable oil, liquid soap and water.
Insect	Hemlock Woolly Adelgid	Proper timing is key to control HWA. 1) Pseudocymnus Tsugae (black lady beetle) 2) Laricobius Nigrinus (beetle), 3) Fungi (V. lecanii)	1) Proper watering, 2) Remove debris and habitat.	Horticultural oils and insecticidal soaps. Note: Homemade insecticidal soap is 1 heavy tablespoon of bio-degradable dish soap to 1 quart (1 liter) of water
Insect	Mosquitoes	1) Natural predators are: bats, birds, dragonflies, beetles, frogs, snails, 2) Stock ornamental ponds with mosquito biting fish such as minnows or bluegills, 3) Bacillus thuringiensis, var israelensis.	1) Seal cracks and crevices, 2) Repair Holes, 3) Create a barrier, 4) Mesh screens, 5) Remove water source: check drains, faucets, and pipes, 6) Remove standing water, 7) Use least toxic repellants such as lemon eucalyptus, rosemary oil, or other essential oils, 8) Sit near a fan when outdoors, 9) Screen yourself in, 10) Burn citronella candle, 11) Mosquito trap.	1) Before hatching, use a least toxic organic larvicides like bacillus thuringiensis israelensis, 2) Horticultural oils (vegetable based) but can kill some mosquito predators that breath from surface.
Insect	Snails/Slugs	1) Natural predators such as Ground beetles, snakes, toads, turtles, birds, 2) Domesticated fowl such as ducks, geese, chickens.	1) Create a barrier, 2) Remove debris and habitat, 3) Handpick and destroy.	1) Table salt, 2) Caffeine concentrations of 1-2%, 3) 1 part household ammonia with 10 parts water sprayed on plant to prevent slug damage, 4) Beer.
Insect	Sod Webworms	1) Nematodes, 2) Bacillus thuringiensis, var. kurstaki.	1) Mow lawn above 3 inches, 2) Aerate soil, 3) Proper watering, 4) Dethatching, 5) Limit fertilizer.	Insecticidal soap, Note: Homemade insecticidal soap is 1 heavy tablespoon of bio-degradable dish soap to 1 quart (1 liter) of water
Insect	Thrips	Predatory thrips, green lacewings, minute pirate bugs, mites, certain parasitic wasps.	1) Stick traps, 2) Mesh screens, 3) Sanitation - use soap and water to clean surfaces, 4) Remove debris such as pruning and row covers and habitat.	Does not warrant the use of insecticides because by the time it is noticed, the thrips are gone.
Insect	Ticks	Natural predators are opossums and domestic fowl.	1) Place trash in sealed container, 2) Remove clutter, 3) Do not let pet go in tick infested area, 4) Discourage mice, 5) Remove piles of leaves, 6) Clean around bushes and trees, 7) Store wood piles away from house, 8) Keep metal trash containers with lids, 9) Wear light colored clothing, 10) Tuck your pants into your sock, 11) Wear a hat, 12) Use an herbal repellent, 13) Create 3-foot wide barrier or wood chips or crushed stone between wooded areas and house.	Various combinations of: citronella, lemongrass, rosemary, peppermint, and cedarwood essential oils.
Insect	Tree Boring Caterpillars	Nematodes	Remove debris and habitat.	If the opening of the tree is unobstructed, blow boric acid, diatomaceous earth, or silica aerogel into it.
Insect	Wasps & Yellowjackets	Skunks, raccoons, and badgers prey upon the nest for honey.	1) Seal cracks and crevices, 2) Repair holes, 3) Create a barrier, 4) Mesh screens such as hardware cloth, 5) Remove trash from property, 6) Vacuum.	1) If in ground, first try pouring soapy water solution into entrance. 2) For aerial nests, use an enzyme solution to help loosen nest. Peppermint oil or dishwasher soap spray solution works also. Note: Homemade insecticidal soap is 1 heavy tablespoon of bio-degradable dish soap to 1 quart (1 liter) of water.
Insect	Whiteflies	1) General predators include lacewings, bigeyed bugs, and minute pirate bugs. Several small lady beetles including Clitostethus arcuatus (on ash whitefly) and scale predators, such as Scymnus or Chilocorus species, and the Asian multicolored lady beetle, Harmonia axyridis, feed on whiteflies.	Remove debris and habitat.	1) Whiteflies can be difficult to control with insecticides. Most less-toxic products such as insecticidal soaps or neem oil control only those whiteflies that are directly sprayed. Therefore, plants must be thoroughly covered with the spray solution, and repeat applications may be necessary. Be sure to cover undersides of all infested leaves; 2) Avoid using other pesticides (other than soaps and oils) to control whiteflies; not only do most of them kill natural enemies, whiteflies quickly build up resistance to them, and most are not very effective in garden situations.
Plant	Apple and Pear Scabs	None	1) Proper watering, 2) Remove debris and habitat.	1) Several fungicides are available: Fixed copper, Bordeaux mixture, copper soaps, sulfur, mineral or neem oil. Note: These fungicides are harmful to beneficial insects and bees.

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Plant	Annual Bluegrass	Goats	1) Create a barrier, 2) Flame treatment, 3) Boiling water, 4) Mow law above 3 inches, 5) Aerate soils, 6) Proper watering not excessive, 7) Dethatching, 8) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Barberry	Goats	Cut to root and destroy, for example, enclosing in a trashbag.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Bittersweet-Asiatic	1) Plants can be eaten by goats, 2) Fruit and seeds eaten by rabbits, squirrels, and birds.	Cut don't pull out of trees before seed is set; then cut frequently through season for multiple seasons; dispose of cut vines carefully, they re-sprout, replant densely with native plants and continue to maintain and monitor replanted area.	For established stand of bittersweet, painting fresh-cut stems of bittersweet at the correct time with an appropriate organic approved herbicide such as Horticultural vinegar (Caustic > 11%, Read directions) at the correct dosage.
Plant	Black Swallow-Wort	None. Poisonous to goats.	1) Mow it to the ground after it has begun to develop seed to stop seed dispersal, 2) Handpick to root and destroy, for example, enclosing in a trash bag, 3) Replant densely with native plants and continue to maintain and monitor replanted area.	A chemical-resistant gauntlet glove is worn and a short absorbent (cotton) glove is worn over the gauntlet glove, then dipped in a non-synthetic herbicide and wiped on the leaves. This must be repeated several times in a season to be effective because it does not kill roots. The plant "starves" due to repeated leaf loss. In a meadow or dense vegetative cover, the treated plants can then be covered with adjacent vegetation to omit sunlight, aiding in control. In such conditions plants can be repeatedly cut at ground level and covered.
Plant	Burning Bush	None. Poisonous to goats.	1) Hand pull seedlings, 2) Hand pull and dig our roots and destroy, 3) Grind out stump or clip new growth each season, 4) Replant densely with native plants and continue to maintain and monitor replanted area.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Chickweed	Goats	1) Mow lawn above 3 inches, 2) Proper watering, 3) Remove debris and habitat, 4) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Clover	Goats; Clover provides natural source of soil nitrogen fertilization and a nectar source for pollinators.	1) Remove debris and habitat, 2) Handpick to root and destroy, for example, enclosing in a trashbag.	Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh.
Plant	Crabgrass	Goats	1) Flame treatment, 2) Mow above 3 inches, 3) Proper watering, 4) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Dandelions	Goats; Dandelion is edible and an important spring nectar source for pollinators.	1) Create a barrier, 2) flame treatment, 3) boiling water, 4) Mow law above 3 inches, 5) Aerate soils, 6) Proper watering not excessive, 7) Dethatching, 8) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Glossy Buckthorn	Goats	Repeated cutting at leaf out or during summer for multiple seasons; replant densely with native plants and continue to maintain and monitor replanted area.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Ground Ivy	Rust fungus (Puccinia glechomatis)	1) Mow lawn above 3 inches, 2) 1) Aerate soil, 3) Proper watering, 4) Dethatching, 5) Handpick to root and destroy, for example, enclosing in a trashbag.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Hardy Kiwi	Goats. The fruit is edible.	Cut don't pull out of trees; then cut frequently through season for multiple seasons; dispose of cut vines carefully, they re-sprout; replant densely with native plants	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Honeysuckle	Goats	Cutting to the ground with a chainsaw, then repeated mowing for several years. Plant thickly with native shrubs such as Cornus racemosa, Physocarpus opulifolius, and Cephalanthus occidentalis.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Japanese Knotweed	Sheep, horses, donkeys, and goats. It is a nectar source for pollinators in the fall. Roots are used as medicine, including treatment of Lyme disease, and the young shoots are edible.	1) Smother or cut repeatedly through the growing season to starve roots (repeat for number of seasons), 2) If a small patch, dig out the roots and destroy. Dispose of plant matter carefully. Repeat if grows back. 3) Knotweed prefers moist soils. Restricting water from lawn irrigation and improving drainage can help contain the plants, 4) Replant densely with native plants and continue to maintain and monitor replanted area.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Multiflora Rose	Goats. It is a nectar source for pollinators.	Repeated cutting at leaf out or during summer for multiple seasons; replant densely with native plants and continue to maintain and monitor replanted area.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Norway Maple	None	Cutting to the ground with chainsaw followed by repeated cutting for several years. Replant densely with native shrubs or trees and continue to maintain and monitor replanted area.	None
Plant	Phragmites Australis	Goats. The plants are used to clean polluted water.	Mow repeatedly throughout season and replant densely with native plants. Reduce nutrient (pollution) in water as phragmites tolerates high nutrient loads compared to native plants. Replant densely with native shrubs or trees and continue to maintain and monitor replanted area.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Plantains	Goats	1) Mow lawn above 3 inches, 2) Aerate soils, 3) Proper watering, 4) Dethatching, 5) Handpick to root, 6) Overseeding with grass seed.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Poison Ivy	Goats; The berries are a food source for birds.	1) With protection, hand pull to root and destroy, for example, enclosing in a trash bag, 3) Hire commercial company to mechanically remove.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.
Plant	Purple Loosestrife	Root-mining weevil (Hylobius transversovittatus) and beetles Galerucella pumila and G. californiensis. It is a nectar source for pollinators.	1) Hand pull to roots and destroy before plants set seed, 2) Dig our larger plants to roots and destroy. Do NOT mow.	1) Horticultural vinegar (Caustic > 11%, Read directions) or try canning white vinegar which is not as harsh, 2) Herbicidal soap. Note: Homemade herbicidal soap consists of: 1/2 gallon of vinegar, 1/2 cup of salt, 2 tablespoon of bio-degradable dish soap.

Sources: <https://beyondpesticides.org/resources/managesafe/choose-a-pest/pestlocation=outdoor#headerphoto>

[https://www.maine.gov/dacf/mfs/forest\\_health/insect\\_disease\\_fact\\_sheets.html](https://www.maine.gov/dacf/mfs/forest_health/insect_disease_fact_sheets.html)

"NOFA Standards for Organic Land Care: Practices for the Design and Maintenance of Ecological Landscapes," 6th edition, 2017 (there isn't an author other than "Created by The NOFA Organic Land Care Program") <http://www.jadvisap.uconn.edu/FactSheets/bacillus-thuringiensis.php>

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