

# Managing diseases and insects in home orchards

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**T**his pest management guide provides the home gardener with information on pest management for home orchards. It does not meet the exacting requirements of the commercial fruit grower. Generally, in the home orchard, more pest damage can be tolerated than in commercial orchards. Thus, the number of suggested materials and the times of application in this guide have been kept to a minimum. Many fungicides and insecticides are available, which, when used according to the label directions, are effective in managing diseases and insects listed on the label. For more complete information, consult the PNW Pest Management Handbooks, available at <https://catalog.extension.oregonstate.edu/>.

To effectively manage diseases and insects in your orchard, it is best to combine a number of techniques. In addition to using pesticides, cultural and biological practices also can help prevent or manage diseases and insects. Timing and thorough spray coverage are the keys to good pest management. Good coverage is achieved by thoroughly wetting the leaves, twigs, and branches; however, this can be difficult with hand sprayers. When using wettable powders, be sure to shake or stir the spray mix frequently during application because the powders tend to settle at the bottom of the spray container after mixing.

To avoid excess chemical residues, observe the rate and proper interval between the last spray and harvest, as indicated on the label. Table 1 lists the preharvest interval for all the recommended pesticides. Be sure to rinse fruit with water before eating.



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**Table 1. Homeowner/small orchard products**

<b>Common name</b>	<b>Some brand names</b>	<b>Some uses<sup>1</sup></b>	<b>Preharvest interval<sup>2</sup></b>
acetamiprid	Ortho Max Flower, Fruit & Vegetable Insect Killer	Codling moth	7
<i>Bacillus subtilis</i>	Bayer Advanced Natria Disease Control, Serenade Garden Disease Control	Diseases	0
<i>Bacillus thuringiensis (Bt)</i>	Thuricide	Leafrollers	0
<i>Beauveria bassiana</i>	Naturalis-O	Aphids	Not specified
bifenthrin	Ortho Max Lawn & Garden Insect Killer (pears only)	Codling moth	14
botanical oils such as neem and jojoba <sup>5</sup>	E-Rase, Organocide 3-in-1 Spray	Powdery mildew and some insects	Not specified
captan	Hi-Yield Captan, Bonide Captan	Diseases	1
carbaryl	Sevin	Many insects	3
chlorothalonil (Daconil)	Bonide Fung-onil, GardenTech Daconil	Diseases	Do not apply after shucksplit
codling moth granulosis virus	Cyd-X	Codling moth	0
combination sprays <sup>3</sup>	Home Orchard Spray, Bonide Fruit Tree and Plant Guard	Diseases and insects	3–7 <sup>4</sup>
dormant oil <sup>5</sup>	Dormant oil	Winter diseases, insects, and mites	Use only during dormant season
esfenvalerate	Bug-B-Gone	Husk fly and codling moth	21 to 28 <sup>4</sup>
fixed copper	Monterey Liqui-Cop and many others	Diseases	Use only early in season or postharvest
gamma-cyhalothrin	Spectracide Triazide Insect Killer	Many insects	14–21 <sup>4</sup>
horticultural mineral oils (HMO) <sup>5</sup>	Volck Oil, Ferti-Lome Horticultural Spray Oil	Spring/summer diseases, insects, and mites	0
insecticidal soap <sup>5</sup>	Safer's Insecticidal Soap	Soft-bodied pests like mites and aphids. Also powdery mildew.	0
kaolin clay	Surround at Home	Pear psylla and apple maggot	Not specified
lambda-cyhalothrin	Fruit Tree & Plant Guard	Many insects	14–21 <sup>4</sup>
malathion	Malathion	Many insects	1–7 <sup>4</sup>
myclobutanil <sup>6</sup>	Spectricide Immunox	Diseases	1 day stone fruits; 14 days apples
neem <sup>5</sup>	Concern Garden Defense, Natural Guard Neem	Many insects	Not specified
permethrin	Bonide Eight Insect Control	Many insects	1–14 <sup>4</sup>
potassium bicarbonate	Bi-Carb Old-fashioned Fungicide	Powdery mildew	Not specified
propiconazole <sup>6</sup>	Bonide Infuse Systemic	Diseases	0
pyrethrins	Bonide Pyrethrin Garden Spray	Many insects	1
spinosad	Bull's-Eye	Leafminers and leafrollers	7–14
sulfur <sup>5</sup>	Safer's Garden Fungicide, Sulfur, Sulfur Dust	Diseases and mites	1

<sup>1</sup> See charts for complete list of uses.

<sup>2</sup> Days to wait after spraying until picking

<sup>3</sup> Contains fungicides and insecticides. See caution about bee kill under "Applying pesticides safely" (page 3).

<sup>4</sup> For the fruit or nut tree you are spraying, check the manufacturer's label for the proper interval.

<sup>5</sup> Soaps and oils are not compatible with sulfurs. Mixing them together or using one right after the other can result in plant damage.

<sup>6</sup> Frequent use can lead to the development of diseases resistant to the chemical.

## Importance of controlling diseases and insects in commercial fruit districts

Many commercial fruit growers in Oregon are adopting nonchemical approaches to managing orchard pests. These “soft” control practices may become less effective if pests spread from nearby, unmanaged trees. If homeowners maintain fruit trees for fruit production, it is critical that they help prevent the spread of pests to commercial orchards. Because of recent changes in pesticide registrations, home orchardists have to provide diligent pest control to prevent damage to nearby commercial orchards. See “Required control programs” (page 9). If you have fruit trees in your yard or landscape that are primarily for shade or aesthetic value, you might consider replacing them with types of trees that do not harbor pests that can negatively affect commercial fruit trees. Contact your local Extension office for a list of suggested replacement trees.

## Applying pesticides safely

Many organic and synthetic formulations of pesticides are available for home garden use. Many are variations with the same active ingredient. Look for pesticides that can be used on a wide range of fruit, vegetables, and ornamentals, so you can limit the number of pesticides you need to purchase and store.

The pesticides listed in this publication were selected on the basis of their effectiveness, availability, and safety. Always apply pesticides according to the label instructions—this is very important. The label contains valuable application information and safety precautions to protect you, others, and the environment. Before you purchase or open the container, read the label. Read it again before you mix, store, or dispose of the product.

Be cautious when using products that contain a combination of one or more insecticides and fungicides, such as the various “home orchard sprays.” Some of these products call for applications during bloom to control fungal diseases. However, if you also apply an insecticide during bloom, you run the risk of reducing or eliminating bees that are critical for pollination. A better strategy, especially during the spring, is to use products that contain only a single type of pesticide and apply them only when necessary. This approach is less convenient but may save you trouble in the long run.

Not every effective pesticide is included here; space constraints make it impossible to list them all. Some of these other pesticide products may be packaged in larger quantities for commercial growers, making them impractical for your orchard if you have only a few trees. Check with your local Extension agent, Oregon State University Master Gardener, or nursery professional for additional information.

## Managing diseases and insects without pesticides

A wide variety of cultural and biological techniques can be used to manage or prevent disease and insect damage. Consult your local Extension agent, OSU Master Gardener, or nursery professional for more information.

- **Select the proper cultivar for your climate and soil.** For example, Liberty, Prima, Akane, and Chehalis apples are resistant to apple scab, while Granny Smith and Gala are not. Apricots are not well adapted west of the Cascades; wet springs prevent apricot fruit set and result in high disease incidence.
- **Water and fertilize properly.** Overwatering can lead to root rot, while overfertilizing can increase disease and insect problems. A soil test is the best first step in managing soil fertility.
- **Proper pruning.** Proper pruning improves fruit quality, air circulation, and pesticide spray coverage.
- **Good sanitation.** Remove and burn diseased branches and leaves. Remove and destroy old fruit from the tree and the ground. Do not use diseased leaves as mulch.
- **Pest monitoring.** Know which pests are likely to attack your trees and when pests might appear. Inspect your orchard regularly. Pheromone and sticky traps are useful pest management tools. Contact your local Extension agent or nursery professional for more information.
- **Biorational pesticides.** Insecticidal soaps and oils are effective against a wide range of tree fruit pests. Microbial pesticides like *Bacillus thuringiensis* (*Bt*) can be used to control certain caterpillars.
- **Biological control.** Enhanced control by natural enemies can be achieved by limiting the total number of pesticide sprays and using selective pesticides when possible.

## Apples

Time of application	Insect or disease	Materials or practices
Late winter (dormant)	Apple anthracnose and scab	Proper pruning to open tree canopy and improve air circulation. Remove and burn diseased branches and fallen leaves. Also remove from the orchard any mummified fruit left in the tree.
	Scale, aphids, and mite eggs	dormant oil
Prepink (before pink bloom shows)	• Scab only	captan or myclobutanil
Pink (just before blossoms open)	• Powdery mildew	<i>Bacillus subtilis</i> or myclobutanil
	• Scab	captan or myclobutanil
Petal fall	• Powdery mildew	<i>Bacillus subtilis</i> , HMO, insecticidal soap, or myclobutanil
	• Scab	captan or myclobutanil
	Aphids	<i>Beauveria bassiana</i> , insecticidal soap, malathion, neem, permethrin, or pyrethrins May require two sprays about 10 days apart.
Summer to harvest	• Codling moth	To be effective, insecticide coverage must be maintained whenever fruit and moths are present. Applications every 7 to 14 days may be necessary, especially near commercial orchards. Acetamiprid, carbaryl, Cyd-X, esfenvalerate, gamma-cyhalothrin, kaolin, lambda-cyhalothrin, malathion, neem, pyrethrins, and spinosad are registered for homeowner use. Pheromone traps can be used to accurately time the first spray.
	Apple maggot	carbaryl, kaolin, malathion, or pyrethrins Where apple maggot occurs, treat from late July until harvest at 10- to 14-day intervals. Sticky traps can be used for monitoring and control.
	Spider mites	insecticidal soap, plant-derived oils, or sulfur
	San Jose and lecanium scale crawlers	HMO or other plant-derived oils, insecticidal soap, or neem
	Aphids	<i>Beauveria bassiana</i> , insecticidal soap, malathion, neem, permethrin, or pyrethrins May require two sprays about 10 days apart.
Postharvest	Apple anthracnose	fixed copper before fall rains Remove and destroy cankered branches from the orchard and any rotted or mummified fruit from the tree.
Leaf fall	Scab	Rake and dispose of leaves by burning, burying, or completely composting. Do not use as a mulch near the orchard.

## Walnuts

Time of application	Insect or disease	Materials or practices
Early prebloom	Bacterial blight	fixed copper
Late prebloom	Bacterial blight	fixed copper
Early postbloom	Bacterial blight	fixed copper
Mid-July to mid-August	Walnut husk flies	esfenvalerate, gamma-cyhalothrin, pyrethrins, or spinosad Use yellow sticky traps to time spray applications.

Commercial growers must control diseases and insect pests of walnuts. In most instances, it is impractical for homeowners to attempt these control practices on large walnut trees.

**Note:** Several Oregon counties have ordinances dealing with backyard fruit tree production that require minimum spray programs to prevent disease/insect spread to commercial orchards. See "Required spray programs" (page 9) for information about requirements in specific counties. The sprays denoted with a (+), if applied at the correct time, should meet the requirements of most counties. Check with your local Extension agent if you are not sure.

## Pears

Time of application	Insect or disease	Materials or practices
Late winter (dormant)	Scab and other diseases	Prune properly to open trees and improve air circulation. Remove and burn diseased branches and fallen leaves. Also remove any mummified fruit left in the tree.
	Pseudomonas blight	fixed copper before buds open
	Scale, aphid, pear psylla, blister mites, and mite eggs	sulfur with dormant oil
Prepink (before pink bloom shows)	• Scab	Bonide Fruit Tree and Plant Guard
	• Pear psylla	insecticidal soap, kaolin, or neem
Pink (just before blossoms open)	• Scab and powdery mildew	Bonide Fruit Tree and Plant Guard
Petal fall	• Scab and powdery mildew	Bonide Fruit Tree and Plant Guard
	Aphids	insecticidal soap or neem May require two sprays about 10 days apart.
Spring (especially after main bloom)	Fire blight (not common in the Willamette Valley)	Remove and destroy infected branches. Make cuts 12 inches below infected branches. Disinfect pruning tools between cuts with shellac thinner (70% ethyl alcohol) or 10% bleach. Remove late blooms when noticed. Difficult to control. Antibiotics are labeled but difficult to use properly.
Summer to harvest	Pseudomonas blight (for Asian pears)	Summer pruning will help reduce branch dieback caused by this disease.
	• Codling moth	To be effective, insecticide coverage must be maintained whenever fruit and moths are present. Applications every 7 to 14 days may be necessary, especially near commercial orchards. Acetamiprid, bifenthrin, carbaryl, Cyd-X, esfenvalerate, gamma-cyhalothrin, insecticidal soap, lambda-cyhalothrin, malathion, permethrin, pyrethins, and spinosad are registered for homeowner use. Pheromone traps can be used to accurately time the first spray.
	Spider mites	HMO or sulfur
	San Jose scale crawlers	HMO or other plant-derived oils, insecticidal soap, or neem
	Pear psylla	esfenvalerate, insecticidal soap, kaolin, or neem
	Aphids	insecticidal soap, kaolin, or neem
Postharvest (in fall after all fruit is harvested)	Blister mites and pear rust mites	sulfur with oil
Leaf fall	Scab	Rake and dispose of leaves by burning, burying, or completely composting. Do not use as a mulch near the orchard.

## Hazelnuts (Filberts)

Time of application	Insect or disease	Materials or practices
Dormant period	Eastern filbert blight	Remove and destroy cankers before budbreak.
Budbreak (and every 2 weeks for four sprays)	Eastern filbert blight	chlorothalonil (120-day, pre-harvest interval)
Spring (about May 1)	Leafrollers	<i>Bacillus thuringiensis (Bt)</i> , carbaryl, esfenvalerate, neem, or spinosad
	Aphids	<i>Beauveria bassiana</i> , insecticidal soap, or neem
Summer (about July 1 and 3 weeks later)	Filbertworm	carbaryl, esfenvalerate, gamma-cyhalothrin, pyrethrins, or spinosad Pheromone traps can be used to properly time sprays.
	Aphids	<i>Beauveria bassiana</i> , insecticidal soap, or neem
August or September (before fall rains)	Bacterial blight	fixed copper Generally only a problem on trees less than 5 years old.

Commercial growers must control diseases and insect pests of hazelnuts. In most instances, it is impractical for homeowners to attempt these control practices on large hazelnut trees.

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## Peaches and Nectarines

Time of application	Insect or disease	Materials or practices
Winter dormant	Cytospora canker and Pseudomonas	Can cause branch dieback. Remove and burn infected wood.
Dormant (two sprays: Dec. 15 and before Jan. 15)	• Leaf curl and shothole	chlorothalonil or fixed copper
Late February	Aphid and mite eggs, and scale	dormant oil For best results, do not combine with leaf curl spray.
	Leaf curl	chlorothalonil
Bloom stages	Brown rot blossom blight	captan, chlorothalonil, or propiconazole Spray once per week, from first showing pink through petal fall.
Prepink and petal fall	Leafrollers	<i>Bacillus thuringiensis (Bt)</i> , carbaryl, esfenvalerate, neem, or spinosad
1 week after blossom petals fall and/or at shucksplit	Shothole	captan or chlorothalonil
Early June	• Peach twig borer	esfenvalerate, gamma-cyhalothrin, permethrin, or pyrethrins Do not use permethrin on nectarines. Pheromone traps can be used to time sprays.
Summer spray (early July and again 3 weeks later)	Peachtree borer	carbaryl, gamma-cyhalothrin, lambda-cyhalothrin, malathion, or pyrethrins Do not use carbaryl, malathion, or pyrethrins on nectarines. Spray trunk and lower limbs thoroughly. Do not spray fruit. Pheromone traps can be used to time sprays. Young trees are especially susceptible to injury from peachtree borers.
Fruit set to harvest	Brown rot	Regularly remove and destroy any fallen or rotted fruit prior to harvest.
14 to 21 days before picking	Western spotted cucumber beetles	carbaryl (western Oregon only)
	Brown rot	captan, propiconazole, or sulfur
	Earwigs	carbaryl Spray trunk and base of tree thoroughly.
	Spotted wing drosophila	carbaryl, esfenvalerate, malathion, pyrethrins, or spinosad Applications may need to be repeated at frequent intervals. Fruit becomes susceptible to attack around the time of color change to light tan. Peach and nectarine may be attacked if fruit is allowed to tree ripen.
Autumn or early winter when leaves begin to fall	• Shothole and leaf curl	chlorothalonil
Anytime before budbreak	Brown rot	Remove and destroy any rotted or mummified fruit remaining in or around the tree.

Choose one timing for leaf curl and shothole in arid areas; use all timings in the Willamette Valley. Shucksplit is the shedding of the papery sheath surrounding the small, young fruit shortly after bloom.

## Apricots

Time of application	Insect or disease	Materials or practices
Late winter (dormant)	Scale and mite eggs	dormant oil
Bloom stages (first showing pink to petal fall)	Brown rot	captan, chlorothalonil, or propiconazole
Shucksplit	• Coryneum blight (shothole)	captan or myclobutanil Fungicide needed only if rain is expected within 2 weeks.
Summer spray	Peachtree borer	gamma-cyhalothrin or lambda-cyhalothrin Spray trunk and lower limbs thoroughly. Do not spray fruit. Pheromone traps can be used to properly time sprays.
2 weeks preharvest	Brown rot	captan or propiconazole Fungicide needed only if rain is forecast.
	Spotted wing drosophila	carbaryl, esfenvalerate, malathion, pyrethrins, or spinosad Applications may need to be repeated at frequent intervals. Apricot may be attacked if fruit is allowed to tree ripen.
Fall (before rains begin)	• Coryneum blight (shothole)	chlorothalonil or fixed copper
	Brown rot	Remove and destroy any rotted or mummified fruit in or around the trees.

Do not use sulfur products on apricots.

Shucksplit is the shedding of the papery sheath surrounding the small, young fruit shortly after bloom.

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# Cherries

Time of application	Insect or disease	Materials or practices
Late winter (dormant)	Aphid and mite eggs, scale, and leafrollers	dormant oil
Bloom stages (first showing pink to petal fall)	Brown rot blossom blight	captan, chlorothalonil, or propiconazole Spray once or twice during early bloom.
Petal-fall stage	Black cherry aphid	<i>Beauveria bassiana</i> , esfenvalerate, insecticidal soap, malathion, pyrethrins, or neem
	Leafrollers	<i>Bacillus thuringiensis (Bt)</i> , carbaryl, malathion, or spinosad Spray after bloom to prevent accidental poisoning of bees during the pollination period.
	Cherry leaf spot and brown rot	captan, chlorothalonil, myclobutanil, or propiconazole
Shucksplit	Cherry leaf spot and brown rot	captan, chlorothalonil, myclobutanil, or propiconazole
	Powdery mildew (a problem east of the Cascades)	<i>Bacillus subtilis</i> , myclobutanil, oils (botanical or HMO), propiconazole, or sulfur
Early summer when fruit flies emerge (about Memorial Day)	• Cherry fruit fly	carbaryl, esfenvalerate, malathion, pyrethrins, or spinosad Applications may need to be repeated at 7- to 14-day intervals. Traps can be used to properly time treatments.
	Spotted wing drosophila	carbaryl, esfenvalerate, malathion, pyrethrins, or spinosad Applications may need to be repeated at frequent intervals. Fruit becomes susceptible to attack around the time of color change to light tan.
	Powdery mildew (a problem east of the Cascades)	<i>Bacillus subtilis</i> , myclobutanil, oils (botanical or HMO), propiconazole, or sulfur
Summer (if pests appear)	Spider mites	insecticidal soap
	Aphids	<i>Beauveria bassiana</i> , esfenvalerate, insecticidal soap, malathion, or neem
1 to 2 weeks before harvest (only if rain is likely)	Brown rot fruit rot	propiconazole or sulfur
After harvest during dry weather	Bacterial canker and Cytospora canker	Can cause branch dieback. Remove and destroy infected wood.
Leaf fall	Leaf spot	Rake and destroy fallen leaves. Do not use as a mulch near the orchard.
	Brown rot	Remove and destroy any mummified fruit in or around trees.

Shucksplit is the shedding of the papery sheath surrounding the small, young fruit shortly after bloom.

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## Prunes and Plums

Time of application	Insect or disease	Materials or practices
Late winter (dormant)	Aphid and mite eggs, and scale	dormant oil
	Cytospora canker and Pseudomonas	Can cause branch dieback. Remove and destroy infected wood.
Bloom stages (first showing pink to petal fall)	Brown rot blossom blight	captan, chlorothalonil, or propiconazole Spray once or twice during bloom.
Petal-fall stage	Aphids	<i>Beauveria bassiana</i> , esfenvalerate, insecticidal soap, or neem
	Leafrollers	esfenvalerate or spinosad Spray after bloom to prevent accidental poisoning of bees during the pollination period.
	Leaf spots and brown rot	captan, chlorothalonil, myclobutanil, or propiconazole
Shucksplit	Leaf spots and brown rot	captan, chlorothalonil, myclobutanil, or propiconazole
Summer spray (early July and 3 weeks later)	Peachtree borer	gamma-cyhalothrin or lambda-cyhalothrin Spray trunk and lower limbs thoroughly. Do not spray fruit. Pheromone traps can be used to properly time sprays.
Preharvest	Brown rot	captan, propiconazole, or sulfur if rain is forecast within 1 to 2 weeks of harvest
	Spotted wing drosophila	carbaryl, esfenvalerate, pyrethrins, or spinosad May attack if fruit is allowed to tree ripen. Applications may need to be repeated at frequent intervals.
Leaf fall	Brown rot	Remove and destroy any rotted or mummified fruit left in or around trees.

Shucksplit is the shedding of the papery sheath surrounding the small, young fruit shortly after bloom.

**Note:** Several Oregon counties have ordinances dealing with backyard fruit tree production that require minimum spray programs to prevent disease or insect spread to commercial orchards. See “Required spray programs” (page 9) for information about requirements in specific counties. The sprays denoted with a (+), if applied at the correct time, should meet the requirements of most counties. Check with your local Extension agent if you are not sure.

## Moss and lichen

Moss and lichen do not damage fruit and nut trees. Regular pruning and using the dormant chemical sprays (copper fungicides or lime sulfur) for disease and insect control will reduce the amount of moss and lichen in trees.

## Pesticide safety tips

- Most accidents occur during mixing; wear rubber gloves and protect your eyes from spilling or splashing chemicals. Avoid getting pesticides on your skin and wash your hands when you finish. While spraying, you should wear a long-sleeve shirt, full-length pants, unlined rubber gloves, and goggles or some type of eye protection. All clothes should be washed after spraying. See *Using Pesticides Safely* (EC 1497) for more information.
- Never eat or smoke when using pesticides. Do not blow your nose during spraying and keep your fingers away from mouth and nose.
- Check your sprayer for leaking hoses, leaking connections, and plugged or worn nozzles. Clean filters to prevent accidents. Mix the pesticide at the recommended rate on the label. Mix only the volume needed to complete the task. Don't exceed the label rate; putting more pesticide into the environment than you need for good control is wasteful and dangerous. When you finish, clean your sprayer immediately and dispose of the rinse water properly.
- Apply pesticides at the right time and under the right weather conditions. Never apply pesticides when winds will cause drift of the chemical off the target area or when temperatures exceed 85°F. Be careful not to let pesticides contaminate neighboring ponds or streams. You are liable for any off-site damage that may result from your misuse of pesticides.
- Store pesticides in a safe, secure place, out of the reach of children and in their original container. Never keep pesticides in beverage bottles or other previously used food or drink containers. Properly dispose of empty glass, metal, and plastic pesticide containers, after first rinsing them three times with plenty of water.
- Accidents can happen. You can reach the Poison Center at 1-800-222-1222.

## Required pest control programs

Several Oregon counties have ordinances dealing with backyard fruit tree production that require home fruit growers to rigorously control pests to prevent disease and insect spread to commercial orchards. Doing that often entails a more exacting control program than those outlined in this publication. Contact your local Extension office for details if you live in any of the following counties:

- Hood River
- Linn
- Union
- Jackson
- Marion
- Wasco
- Josephine
- Polk
- Yanhill
- Lane
- Umatilla

## Brown marmorated stink bug

Brown marmorated stink bug (BMSB), *Halyomorpha halys*, may be the next exotic pest to affect tree fruits and nuts in Oregon. Until recently, this insect was not considered to be a major threat. First identified in Portland in 2004, BMSB has increased substantially. BMSB is present throughout the Willamette Valley, the Columbia Basin, and other areas of eastern Oregon. Adults will aggregate or overwinter in homes and other structures, and can become numerous in attics and porches. They find abundant host plants in neighborhoods on which to feed and lay eggs. Because this invader thrives in urban and natural habitats, it could prove difficult to manage in fruit and nut crops. For more information on this pest visit: <http://horticulture.oregonstate.edu/group/brown-marmorated-stink-bug-oregon>

## OSU Extension Service publications

Available online at <https://catalog.extension.edu/>

- *PNW Insect Management Handbook*  
<https://catalog.extension.oregonstate.edu/insect>
- *PNW Plant Disease Management Handbook*  
<https://catalog.extension.oregonstate.edu/plant>
- *PNW Weed Management Handbook*  
<https://catalog.extension.oregonstate.edu/weed>
- *Using Pesticides Safely* (EC 1497)  
<https://catalog.extension.oregonstate.edu/ec1497>

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