

Pear

2011 Pest Management Guide for the Willamette Valley

EM 8420

Revised February 2011

The chemicals, formulations, and rates listed for insect, mite, and disease control are among the best recommendations based on label directions, research, and orchard use experience. Only a thorough knowledge of the orchard, its variety, tree size and density, canopy characteristics, pest complex, and past pest problems will enable you to correctly select chemicals, rates, amount of water used per acre, and method of application for optimum pest control. Occasionally, different formulations of a product or like formulations containing a different amount of active ingredient also are registered and effective for use on the pests listed. These products also may be used; we do not intend to discriminate against them. You may wish to consult their labels and determine whether their use confers advantages over the products listed in this guide.

Always refer to the pesticide label for use instructions. It is the legal document regarding use patterns. Two questions frequently are asked about the chemical control of insects and diseases: "How much chemical do I use per acre?" and "What is the least amount of water I need per acre to apply in my concentrate sprayer?" Notice that the schedule below suggests a amount of formulated product (not active ingredient) to use per acre. This amount is based on a "typical" middle age and density orchard with moderate pest pressure. Common sense indicates that less material may be needed (than that given) for 1- to 4-year-old orchards. Conversely, more chemical (within label limits) may be required for large, mature trees experiencing heavy pest pressure from multiple pests.

Many insecticide labels today indicate the minimum amount of water needed per acre to apply concentrate sprays of insecticides, as well as how to calculate the amount of chemical needed per acre in a concentrate sprayer. CHECK LABEL BEFORE SPRAYING!! Some label directions indicate dilute applications only, such as the dimethoate labels for cherry fruit fly control.

Also:

1. Make sure any tank mixes of pesticides are compatible. For example, the elevated pH of some boron spray solutions weakens many insecticides. Boron also is not compatible with water-soluble packets.
2. Use adjuvants and spreader stickers with caution.
3. Heavy, brief rain or extended rainfall (0.75 inch for more than 24 hours) can remove pesticides from fruit and foliage. Reapplication may be necessary within label limits.

Important information

1. Be aware of worker protection standards (WPS). All new pesticide labels will provide orchard reentry intervals and personal protection equipment information.
2. Diazinon is now classified as a restricted use pesticide due to bird toxicity. Maximum per-acre application rates have been reduced to 4 lb 50% and the preharvest interval extended to 21 days.
3. Agri-Mek 0.5EC is registered on pears to control pear psylla and mites.
4. Mitac has been cancelled for mites.

Stages

Dormant Season (Stage 0)

Delayed Dormant (Stages 1-2)

Tight Cluster Bud or Deep pink (Stage 3)

Pink or Preblossom (Stages 4-6)

Not shown

Calyx

First Cover Spray

Second Cover Spray

Third Cover Spray

Preharvest

Postharvest



Illustration courtesy of Washington State University Extension

Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides. Materials are not listed in order of preference.

Pear Pest Control Recommendations

Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides. Materials are not listed in order of preference.

Dormant (Stage 0)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Pear psylla (adults and eggs), scale		
<i>Note:</i> Apply just prior to egg deposition. Thorough coverage is important.		
horticultural mineral oil (HMO)	4-6 gal	The oil spray alone repels adult psylla and inhibits egg laying.
HMO + one of the following:	4-6 gal	The oil + synthetic pyrethroids kills adult psylla.
Asana XL	10-19 oz	—
Danitol 2.4EC	16-21.33 oz	Do not apply more than 42.66 oz/A per season.
Pounce 3.2EC	8-16 oz	—
Surround	See labels for rates	Apply in 200 gal water at the beginning of pear psylla egg laying. Maintain coverage until bloom with additional applications to prevent egg laying. 0-day PHI.
Warrior II	1.3-2.5 oz	21-day PHI.

Pear rust mite, pear leaf blister mite

Note: Apply before bud swell if pear rust mite has been a problem in previous years.

HMO + one of the following:		
flowable sulfur (6 lb ai/gal)	2 gal	—
lime sulfur	10 gal	—
wettable sulfur (80%)	16-20 gal	—

Delayed Dormant (apply when buds are swelling but before bud scales drop, to minimize injury—Stages 1 and 2)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Mites		
lime sulfur solution (Ca polysulfide 29%) + horticultural mineral oil (HMO)	7 gal	—
	6 gal	—
Pear psylla adults, European red mite, San Jose scale, European fruit scale, lygus bug		
HMO + one of the following:	4-6 gal	If scale is a problem, increase gallonage to 500 gpa. Calibrate to discharge two-thirds of volume out of top one-third of sprayer.
Asana XL	9.6-19.2 oz	Very toxic to bees and fish.
Battalion	7-14.1 fl oz	21-day PHI.
Pounce 3.2EC	8-16 oz	Very toxic to bees and fish.
Esteem 35WP	4-5 oz	Limited to 2 applications per season. 45-day PHI.
Warrior II	1.3-2.5 oz	21-day PHI.

Delayed Dormant continues on next page

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CONTINUED—Delayed Dormant (apply when buds are swelling but before bud scales drop, to minimize injury—Stages 1 and 2)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Scales, lygus bug, grape mealybug, stink bug, mite eggs		
HMO + one of the following:	4-6 gal	The $\frac{2}{3}$: $\frac{1}{3}$ calibration should be used for all sprayers and all applications.
diazinon 50WP	4 lb	Limited to 1 application per season.
Lorsban 4E	2 qt	—

Pseudomonas

Note: See footnote 6, page 11.

Copper-Count-N	8-12 qt	12-hour reentry.
Cuprofix MZ	12-14.7 lb	24-hour reentry.
Kocide 3000	5.5-7 lb	Copper may not be compatible with other spray materials. Do not attempt to mix it with other fungicides or insecticides. 48-hour reentry.
ManKocide	12-16 lb	24-hour reentry.
Nu-Cop 50DF	12-16 lb	24-hour reentry.

Tight Cluster Bud (after scales drop) or Preprink—Stage 3

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Scab		
Note: See footnote 9, page 11.		
Adament 50WG	4-5 oz	Effects on scabs have not been studied. 5-day reentry. 75-day PHI.
Distinguish 480SC	14.2 fl oz	Group 9-11 fungicide. Do not use an adjuvant. 12-hour reentry. 72-day PHI.
Flint 50WG	2-2.5 oz	Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 14-day PHI.
mancozeb	3 or 6 lb	Do not use the 6 lb/A rate beyond bloom. 24-hour reentry.
Procure	8-13 fl oz	12-hour reentry. 14-day PHI.
Sovran	4-6.4 oz	See footnote 8, page 11. Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 30-day PHI.
Sulforix	2 g/100 gal water	See footnote 5, page 11.
Syllit 65WP	5-7 lb	Mix with another fungicide. See footnote 1, page 11. 48-hour reentry. 7-day PHI.
Ziram 76DF	6-8 lb	48-hour reentry. 5-day PHI.

Rust mites

endosulfan 50WP	3-1 lb	—
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Pear psylla adults

Note: All of the products listed below are detrimental to predatory mites with this timing.

Asana XL	9.6-19.2 oz	Do not exceed 0.375 lb ai/A per season.
Pounce 3.2EC	12-16 oz	Do not exceed 2 applications prebloom.
Warrior II	1.3-2.5 oz	21-day PHI.

Thrips, lygus, stink bugs

endosulfan 50WP	3-4 lb	Do not exceed 2 applications per year or 6 lb/A per year.
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Pink or Preblossom (just before blossoms open—Stages 4-6)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Scab		
<i>Note:</i> See footnote 9, page 11.		
Adament 50WG	4-5 oz	Effects on shape have not been studied. 5-day reentry. 75-day PHI.
Distinguish 480SC	14.2 fl oz	Group 9+11 fungicide. Do not use an adjuvant. 12-hour reentry. 72-day PHI.
Flint 50WG	2-2.5 oz	Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 14-day PHI.
mancozeb	3 or 6 lb	Do not use the 6 lb/A rate beyond bloom. 24-hour reentry.
Pristine	14.5-18.5 oz	Do not make more than two consecutive applications. 12-hour reentry. 0-day PHI.
Procure	8-16 fl oz	12-hour reentry. 14-day PHI.
Sovran	3.2-6.4 oz	See footnote 8, page 11. Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 30-day PHI.
Sulforix	2 qt/100 gal water	See footnote 5, page 11.
Syllit FL	1.5-3 pt	Mix with another fungicide. See footnote 1, page 11. 48-hour reentry. 7-day PHI.
Ziram 76DF	6-8 lb	48-hour reentry. 5-day PHI.
Powdery mildew		
<i>Note:</i> See footnote 9, page 11.		
Adament 50WG	4-5 oz	Effects on shape have not been studied. 5-day reentry. 75-day PHI.
Distinguish 480SC	14.2 fl oz	Group 9+11 fungicide. Do not use an adjuvant. 12-hour reentry. 72-day PHI.
Flint 50WG	2-2.5 oz	Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 14-day PHI.
HMO such as JMS Stylet oil	1-2 gal/100 gal water	Do not use within 10 days of a sulfur application.
Kumulus	10-20 lb	24-hour reentry.
Ph-D	6.2 oz	4-hour reentry. 0-day PHI.
Pristine	14.5-18.5 oz	Do not make more than two consecutive applications. 12-hour reentry. 0-day PHI.
Procure	8-16 fl oz	12-hour reentry. 14-day PHI.
Sovran	4-6.4 oz	See footnote 8, page 11. Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 30-day PHI.
Sulforix	2 qt/100 gal water	See footnote 5, page 11.
Unicorn	2-6 lb	Group 3 fungicide + sulfur. 5-day reentry. 75-day PHI.
Pseudomonas		
streptomycin 21.2%	28.8 oz	Do not overuse; bacterial populations can quickly develop resistance to this antibiotic. 12-hour reentry. 30-day PHI.

Pink or Preblossom continues on next page

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CONTINUED—Pink or Preblossom (just before blossoms open—Stages 4-6)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Pear psylla adults		
<i>Note:</i> Some of the following pesticides are toxic to bees and fish. All are detrimental to predatory mites with this timing. Carefully read the labels for precautions.		
Actara 25WDG	5.5 oz	35-day PHI.
Asana XL	9.6-19.2 oz	Do not exceed 0.375 lb ai/A per season.
Assail 70WP	1.1-3.4 oz	7-day PHI.
Centaur WDG	34.5-46 oz	14-day PHI.
FujiMite 5EC	2 pt	14-day PHI.
Nexter	6.6-10.67 oz	7-day PHI.
Pounce 3.2EC	8-16 oz	Do not exceed 3 applications per season.
Proaxis	2.56-5.12 oz	For psylla suppression only. 21-day PHI.

Green fruitworm, lygus and stink bugs, thrips, pear psylla, rust mites

endosulfan 50WP	4 lb	Do not apply Thiodan more than 2 times per year or use more than 6 lb/A per year. 7-day PHI.
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Calyx (When three-quarters of the petals have fallen, before calyx or central fruit cluster closes)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Scab and powdery mildew		
<i>Note:</i> See Pink or Preblossom Stage for materials and remarks.		
Bull's eye rot		
Ziram 76DF	6 lb	48-hour reentry. 14-day PHI.

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First Cover Spray (about 15 days after petals fall—see footnote 2 , page 11)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Scab		
<i>Note:</i> See footnote 9, page 11.		
Adament 50WG	4-5 oz	5-day reentry. 75-day PHI.
Distinguish 480SC	14.2 fl oz	Group 9+11 fungicide. Do not use an adjuvant. 12-hour reentry. 72-day PHI.
Flint 50WG	2-2.5 oz	Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 14-day PHI.
mancozeb	3 lb	24-hour reentry. 77-day PHI.
Pristine	14.5-18.5 oz	No more than 2 consecutive applications. 12-hour reentry. 0-day PHI.
Procure	8-16 fl oz	12-hour reentry. 14-day PHI.
Rubigan	9-12 oz	Should be tank-mixed with a product that has good protection activity. Do not use before petal fall. 12-hour reentry. 30-day PHI.
Sovran	3.2-6.4 oz	See footnote 8, page 11. Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 30-day PHI.
Sulforix	2 qt/100 gal water	See footnote 5, page 11.
Syllit FL	1.5-3 pt	Mix with another fungicide. See footnote 1, page 11. 48-hour reentry. 7-day PHI.
Tebuzol 45DF	4-8 oz	5-day reentry. 75-day PHI.
Ziram 76DF	6 lb	48-hour reentry. 74-day PHI.

Powdery mildew (only if needed)

Note: See footnote 9, page 11.

Adament 50WG	4-5 oz	5-day reentry. 75-day PHI.
Distinguish 480SC	14.2 fl oz	Group 9+11 fungicide. Do not use an adjuvant. 12-hour reentry. 72-day PHI.
Flint 50WG	2-2.5 oz	Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 14-day PHI.
HMO such as JMS Stylet oil	1-2 gal/ 100 gal water	Do not use within 10 days of a sulfur application.
Kumulus	10-20 lb	24-hour reentry.
Ph-D	0.2-0.25 oz	4-hour reentry. 0-day PHI.
Pristine	14.5-18.5 oz	Do not make more than two consecutive applications. 12-hour reentry. 0-day PHI.
Procure	8-16 fl oz	12-hour reentry. 14-day PHI.
Rubigan	9-12 oz	Should be tank-mixed with a product that has good protection activity. Do not use before petal fall. 12-hour reentry. 30-day PHI.
Sovran	3.2-6.4 oz	See footnote 8, page 11. Rotate with other fungicides. Do not make more than 2 consecutive applications. 12-hour reentry. 30-day PHI.
Sulforix	2 qt/100 gal water	See footnote 5, page 11.
Tebuzol 45DF	4-8 oz	5-day reentry. 75-day PHI.
Unicorn	2-3 lb	Group 3 fungicide + sulfur. 5-day reentry. 75-day PHI.

First Cover Spray continues on next page

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CONTINUED—First Cover Spray (about 15 days after petals fall—see footnote 2 , page 11)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Pear psylla (only if a problem)		
Agri-Mek, Epi-mek 0.15EC	16-20 oz	Use up to second cover (late June). Effectiveness of Agri-Mek diminishes in late season. Alternate with other available insecticides for summer control of pear psylla as a resistance management strategy. 28-day PHI.
Assail 70WP	1-3.4 oz	7-day PHI.
Calypso 4F	4-8 oz	30-day PHI.
FujiMite 5EC	2 pt	14-day PHI.
Provado 1.6F	16-20 oz	7-day PHI.
Codling moth		
Altacor	3-4.5 oz	5-day PHI.
Assail 70WP	3.4 oz	7-day PHI.
Avaunt 30WDG	6 oz	28-day PHI.
azinphos-methyl 50WSB (Guthion)	1-2 lb	See footnote 2, page 11. 14- to 21-day PHI.
Calypso 4F	4-8 oz	30-day PHI.
Carpovirusine	6.8-13.5 oz	0-day PHI.
Clutch	6 oz	7-day PHI.
CYD-X	1-6 oz	0-day PHI.
Danitol 2.4EC	16-21.3 oz	14-day PHI.
Delegate	6-7 oz	7-day PHI.
diazinon 50WP	4 lb	Limited to 1 application per season. See footnote 3, page 11. 21-day PHI.
Entrust 80WP	1-5 oz	1-day PHI.
Esteem 35WP	1-5 oz	45-day PHI.
Imidan 70WP	4-5 lb	A water-soluble bag formulation (70WSB) also is available. 7-day PHI.
Intrepid 2F	16 oz	Apply at or just prior to egg hatch. 14-day PHI.
Proclaim 5SG	3.2-4.8 oz	14-day PHI.
Virosoft	See label	0-day PHI.
Pear psylla, stink bugs, aphids		
endosulfan 50WP	4-5 lb	Do not apply endosulfan more than 2 times per year or use more than 6 lb/A per year. 7-day PHI.
Intor 1.25SC	10-14 oz	7-day PHI.
Rust mites only		
Agri-mek, Epi-mek 0.15EC	10-20 oz	28-day PHI.
Envidor 23C	18 oz	7-day PHI.
Nexter 75WP	5.2-10.67 oz	7-day PHI.
Vendex 50WP	6-8 oz	14-day PHI.

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Second Cover Spray (15 or more days after first cover spray—see footnote 2 and footnote 4, page 11)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Scab and powdery mildew		
<i>Note:</i> See materials and rates for the First Cover Stage.		
Pear psylla only		
Assail 70WP	1-3.4 oz	7-day PHI.
Codling moth		
Altacor	3-4.5 oz	Do not use an adjuvant with Altacor. 5-day PHI.
azinphos-methyl 50WP (Guthion)	1-2 lb	14- to 21-day PHI.
Centaur	34.5 oz	14-day PHI.
diazinon 50WP	4 lb	Limited to 1 application per season. See footnote 3, page 11. 21-day PHI.
Imidan 70WP	3.5-5 lb	A water-soluble bag formulation (70WSB) also is available. 7-day PHI.
Pear psylla, stink bugs		
endosulfan 50WP	4-5 lb	Do not use more than 2 times per year or apply more than 6 lb/A per year. 7-day PHI.
Ultror	10-14 oz	7-day PHI.
Scale, aphids		
diazinon 50WP	4 lb	Limited to 1 application per season. See footnote 3, page 11. 21-day PHI.
Spider mites		
Acramite 50WS	0.75-1 lb	7-day PHI.
Agri-Mek, Epi-mek 0.15EC	10-20 oz	Use up to second cover (late June). Effectiveness of Agri-Mek diminishes in late season. Alternate with other available insecticides for summer control of pear psylla as a resistance management strategy. 28-day PHI.
Apollo 50SC	4-8 oz	21-day PHI.
Envidor 2SC	18 oz	7-day PHI.
Fujimite	2 pt	14-day PHI.
Kanemite 45S0	21-31 oz	14-day PHI.
Nexter 75WP	5.2-10.67 oz	7-day PHI.
Onager	12-24 oz	28-day PHI.
Savey 50DF	4-6 oz	One application per season. Do not use any combination of Apollo, Onager, and Savey in the same growing season. 28-day PHI.
Vendex 50WP	1-2 lb	Do not apply more than 3 times between petal fall and harvest. 14-day PHI.
Zeal 72WDG	2-3 oz	14-day PHI.

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Third Cover Spray (usually about last of July or first week in August—see footnote 2, page 11)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Codling moth		
Altacor	3-4.5 oz	5-day PHI.
azinphos-methyl 50 WSB (Guthion)	1-2 lb	14- to 21-day PHI.
diazinon 50WP	4 lb	See footnote 3, page 11. 21-day PHI.
Imidan 70WP	3-5 lb	A water-soluble bag formulation (70WSB) also is available. 7-day PHI.
Pear psylla, codling moth, scale, aphids		
diazinon 50WP	4 lb	See footnote 3, page 11. IMPORTANT: In some areas, diazinon no longer gives adequate control of pear psylla. Under such circumstances, use azinphos-methyl for pear psylla and codling moth control. 21-day PHI.
endosulfan 50WP	4-5 lb	Do not exceed 2 applications per year or 6 lb/A per year. 7-day PHI.
Spider mites		
Acramite 50WS	0.75-1 lb	7-day PHI.
Agri-Mek, Epi-mek 0.15EC	10-20 oz	Use up to second cover (late June). Effectiveness of Agri-Mek diminishes in late season. Alternate with other available insecticides for summer control of pear psylla as a resistance management strategy. 28-day PHI.
Apollo 50SC	4-8 oz	21-day PHI.
Fujimite	2 pt	14-day PHI.
Savey 50WP	4-6 oz	28-day PHI.
Vendex 50WP	1-3 lb	Do not apply more than 3 times between petal fall and harvest. 14-day PHI.
Zeal	2-3 oz	28-day PHI.

Preharvest

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Storage rots, such as Bull's eye rot		
Pristine	14.5-18.5 oz	Do not use if used for powdery mildew or scab during the growing season. 12-hour reentry. 0-day PHI.
Ziram 76DF	6 lb	48-hour reentry. 14-day PHI.

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Postharvest (in fall after all fruit is harvested)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Pear leaf blister mite, pear rust mite		
lime sulfur solution (Ca polysulfide 29%) + horticultural mineral oil (HMO)	4 gal/100 gal water	Use this rate postharvest through September. Lime sulfur also helps control psylla and mites.
Sulforix	0.75 gal/100 gal water	—
	Follow label directions	—
Pear leaf blister mite, pear rust mite, scale, aphid and mite eggs, pear psylla		
lime sulfur solution (Ca polysulfide 29%) + superior oil	3-5 gal/100 gal water	Use this rate postharvest in late fall when temperatures cool (mid-October through November).
	1.5-2 gal/100 gal water	—
Anthracnose		
<i>Note:</i> Apply before fall rains.		
bordeaux 8-8-100	—	—
Copper-Count-N	8-12 qt	12-hour reentry.
Cuprofix Ultra 40 Disperss	7.5-10 lb	48-hour reentry.
Kocide 3000	5.25-7 lb	48-hour reentry.
ManKocide	12-16 lb	24-hour reentry.
Nu-Cop 50DF	12-16 lb	24-hour reentry.
Ziram 76DF	6 lb	48-hour reentry, 14-day PHI.

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Footnotes

1. Syllit is not compatible with lime and should not be combined with oils or oil emulsions. Alternate with other products to delay development of resistant fungi.
2. Notice of first emergence of codling moth sometimes is sent out by Extension agents to growers and/or newspapers. Pheromone traps are available to monitor emergence and activity in individual orchards.
3. Diazinon is compatible with ferbam, ziram, and wettable sulfur.
4. Although Topsin is registered for use for control of scab, powdery mildew, and storage rots, it is not recommended for use in orchards. The use of Topsin in orchards will increase the possibility that tolerant (resistant) strains of fungi will develop and increase losses in orchards and packing houses where Mertect 340F or Decco Salt #19 are used. Topsin also is toxic to earthworms, which help decompose scab-infected leaves.
5. Do not use lime sulfur on Anjou and Comice pears after the dormant application as it interferes with fruit set. It should be recognized that although lime sulfur and other sulfur materials are relatively low in cost, they are not without limitations. The use of sulfurs may result in phytotoxicity when temperatures exceed 90°F following application.
6. Pseudomonas injury may resemble fire blight. Although fire blight generally is not a problem in the Willamette Valley, it has been observed in some years. Do not use copper-based products on Anjou, Comice, or Forelle pears past Delayed Dormant.
7. Integrated Pest Management principles are being used successfully in Pacific Northwest orchards to manage insects, mites, diseases, and other pests. These research-based techniques provide effective monitoring methods and management practices for sustained and economical control of pests while minimizing damage to beneficial organisms. Improved health and minimal environmental impact are benefits often cited in IPM-managed orchards using reduced pesticide programs.

The comprehensive reference, *Orchard Pest Management: A Resource Book for the Pacific Northwest, 1993*, edited by Beers, Brunner, Willet, and Warner, was produced by research and Extension personnel from the tristate region. It serves as OSU's guide to effective IPM principles for managing insect and mite pests in the state. We recommend its use in conjunction with the numerous regional OSU Extension Service Orchard Pest Management Guides produced and/or distributed in the different tree fruit districts of the state. It addresses key elements of IPM for controlling pests, including prevention, monitoring, indicating "Action Levels" or pest densities at which time to apply controls, and effective alternative strategies based on current knowledge. Although designed for the commercial orchard, many principles and control considerations apply to noncommercial trees.

8. Sovran drift may injure sweet cherry cultivars such as Van. Please be extra careful when spraying near cherry orchards.
9. Do not exceed four applications per season of Group 11 fungicides such as Sovran, Flint, Pristine, etc.

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Table 1. Spotts Model for Estimating Pear Scab Infection Periods

Average temperature (°F) during leaf wetness	Minimum hours of leaf wetness required for infection
45	25
46	22
48	19
50	17
52	15
54	14
55	12
57	12
59	11
61	11
63	10
64	10
66	10
68	10
70	10
72	10
73	10
75	10

In the fall, examine all leaves on 10 shoots on each of 10 trees scattered throughout the orchard. If you find fewer than six leaves with scab, the overall risk from scab is low enough to skip the first fungicide spray at Pink.

The end of the ascospore infection period occurs after the first rain following the accumulation of 1,620 degree days (32°F base) starting at delayed dormant.

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For most current information:
<http://extension.oregonstate.edu/catalog>

Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides. Materials are not listed in order of preference.

Table 2. Effectiveness of Fungicides and Bactericides for Pear Disease Management*

Fungicide or bactericide	Group #	Pear scab	Powdery mildew	Bull's eye rot	Storage rots	Fire blight
Adament	3+11	Good-excellent	Excellent	??	??	None
Blight Ban	Not classified	??	??	??	??	Poor-fair
Copper-based products	M1	??	Fair??	Poor	??	Fair
Distinguish	9+11	Good-excellent	Excellent	Fair	??	None
Flint	11	Excellent**	Excellent**	Fair	??	None
Horticultural mineral oils	Not classified	??	Good	??	??	None
Lime sulfur	M2	Good	Fair	??	??	None
Mancozeb products	M3	Excellent	None	Poor	??	None
ManKocide	M3+M1	Excellent	None	Poor	??	Fair
Oxytetracycline	41	None	None	None	None	Fair-good**
Ph-D	17	??	Good	??	??	None
Pristine	7+11	Good-excellent**	Excellent**	Good	Fair-good	None
Procure	3	Good**	Excellent**	??	??	None
Rubigan	3	Good**	Excellent**	??	??	None
Scala	9	Fair-good	None	??	??	None
Serenade Max	Not classified	??	Fair	??	??	Fair-good
Sovran	11	Excellent**	Excellent**	??	??	None
Streptomycin	25	None	None	None	None	Poor-excellent**
Sulfur	M2	Fair	Good	??	??	None
Syllit	M1	Good**	None	??	??	None
Tebuzol	5	Good**	Excellent**	??	??	None
Topsin	1	Good**	Good**	Excellent	Good	None
Unicorn	3+M2	Good	Good	??	??	None
Ziram	M3	Fair	None	Fair	Fair-good	None

*These ratings are relative rankings based on spray application rates, good spray coverage, and proper spray timing. Actual levels of disease control will be influenced by these factors in addition to cultivar susceptibility, disease pressure, and weather conditions. Possible ratings for disease control include none, poor, fair, good, or excellent.

**Resistant pathogen will lower the effectiveness of this fungicide.

Follow the "Rules" for fungicide stewardship:

Rotate or mix fungicides of different chemical groups.

Use labeled rates.

Limit total number of applications.

Educate yourself about fungicide activity, mode of action, and class—as well as resistance management practices.

Start a fungicide program with multisite mode of action materials.

Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides. Materials are not listed in order of preference.

Table 3. Registered Herbicides for Orchard Crops in Oregon

For a more complete guide to orchard crop weed management, please refer to the *PNW Weed Management Handbook*, available in hard copy or online (<http://extension.oregonstate.edu/catalog/>). For access to herbicide labels, visit the CDMS Agro-chemical database (<http://www.cdms.net/LabelsMsds/LMDefault.aspx>) or Greenbook (<http://www.greenbook.net/>).

Site preparation		
Material	Uses	Rate
glyphosate (numerous product names)	—	Read label carefully for crops listed and geographic location.
New plantings (newly planted trees less than 1 year old), nonbearing		
Material	Uses	Rate
napropamide (Devrinol)	All except chestnuts	5 lb ai/A (50 lb/A Devrinol 20-6)
oryzalin (Surflan)	—	2-6 lb ai/A (2-6 qt/A Surflan AS)
pendimethalin (Prowl H20, 3.3)	All fruits and nuts	1.9-6 lb ai/A (2-6.3 qt/A) depending on desired weed control and crop
flumioxazin (Chateau SW and WDG)	Pome, stone, and nut trees	0.188-0.38 lb ai/A Chateau WDG. Slight differences in rates and uses in SW and WDG labels. Refer to label for organic matter, soil types, and rates for various broad leaf weeds.
isoxaben (Gallery or Gallery T & V)	Nonbearing crop only, except chestnuts	0.66-1 lb ai/A (0.66-1.33 lb/A product)
trifluralin (Treflan 4EC)	Newly established, nonbearing and bearing, except pears, chestnuts, and hazelnuts	0.5-1 lb ai/A (1-2 pt/A Treflan 4EC)
isoxaben + trifluralin (Snapshot 2.5TG)	Nonbearing crop only, except chestnuts	5 lb ai/A (200 lb/A Snapshot 2.5TG)
trifluralin + isoxaben + oxyfluorfen (Showcase)	Nonbearing crops only, including apricots, cherries, nectarines, peaches, plums, and prunes, excluding apples, pears, hazelnuts, walnuts, and chestnuts	2.5-5 lb ai/A (100-200 lb/A Showcase)
pronamide (Kerb)	—	1-4 lb ai/A (2-8 lb/A). Rate depends on species present and soil texture.
fluazifop (Fusilade DX)	Apples, pears, hazelnuts, and walnuts	0.25-0.375 lb ai/A (16-24 oz/A Fusilade DZ). Refer to specific grassy weeds on label.
sethoxydim (Poast)	Except prunes and plums	0.28-0.47 lb ai/A (1.5-2.5 pt/A product)
clothianidin (Envoy, Prisma Select)	Nonbearing trees only	0.06-0.125 lb ai/A (6-8 oz/A Select)
paraquat (Gramoxone Inteon, Firestorm)	—	0.625-1 lb cation/A (2.5-4 pt/A Gramoxone; 1.7-2.7 pt/A Firestorm)
glyphosate (numerous product names)	—	Read label carefully for crops listed and geographic location.
glyphosate (numerous product names)	—	Wiper: 33% solution
glufosinate ammonium (Rely)	Apples, hazelnuts, and walnuts	0.75-1.5 lb ai/A (3-6 qt/A Rely)
oxyfluorfen (Goal 2XL)	—	1.25-2 lb ai/A (5-8 pt/A Goal 2XL)

Use only one material except where a combination is indicated. Follow label precautions when tank-mixing oils, fungicides, and insecticides. Materials are not listed in order of preference.

Established plantings/Applications that persist in the soil

Material	Uses	Rate
pendimethalin (Prowl H20)	—	Prowl H20: 1.9-6 lb ai/A (2-6.3 qt/A), depending on desired length of weed control and crop.
flumioxazin (Chateau SW and WDG)	Pome, stone, and nut trees	0.188-0.38 lb ai/A Chateau WDG. Slight differences in rates and uses in SW and WDG labels. Refer to label for organic matter, soil types, and rates for various broadleaf weeds.
dichlobenil (Casoron)	Apples, pears, cherries, and hazelnuts	4-6 lb ai/A (100-150 lb/A Casoron)
diuron (Karmex DF and others)	Apples, pears, peaches, hazelnuts, and walnuts only	See label for crop-specific application rates.
simazine (Princep Caliber 90 is a Special Local Needs label (OR-080038) for sweet cherries only). Tart cherries have a federal label for Princep 4L, Caliber 90, and other simazine herbicides in Oregon.	Except chestnuts, apricots, prunes, and nectarines	See product labels for rates.
terbacil (Sinbar 80)	Bearing apples and peaches only; labeled for nonbearing apricot, pear, apple, cherry, peach, and plum	0.4-0.8 lb ai/A (0.5-1 lb/A), newly established; 1-4 lb/A Sinbar, bearing, depending on soil type.
norflurazon (Solicam)	Except chestnuts	1.97-7.8 lb ai/A (2.5-10 lb/A Solicam)
napropamide (Devrinol)	Except chestnuts	5 lb ai/A (50 lb/A Devrinol 10G)
oryzalin (Surflan AS)	Except apples, cherries, nectarines, peaches, prunes, and walnuts	0.5 lb ai/A (2-6 qt/A Surflan)
pronamide (Kerb)	Except hazelnuts and walnuts	1-4 lb ai/A (2-8 lb/A Kerb 50W)
trifluralin (Treflan 4EC)	Stone fruit and walnuts	0.5-1 lb ai/A (1-2 pt/A Treflan 4EC)
oxyfluorfen (Goal 2XL)	—	1.25-2 lb ai/A (5-8 pt/A Goal 2XL)

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Established plantings/Postemergence contact and translocated herbicides

Material	Uses	Rate
paraquat (Gramoxone Max, Firestorm)	—	0.625-1 lb cation/A (2.5-4 pt/A Gramoxone; 1.7-2.7 pt/A Firestorm)
oxyfluorfen (Goal 2XL)	—	1.25-2 lb ai/A (5-8 pt/A Goal 2XL)
pyraflufen (Venue)	—	0.7-4 fl oz product/A (0.001-0.006 lb ai/A)
saflufenacil (Treevix)	Pome fruits and walnuts	1 oz/A (0.045 lb ai/A)
glyphosate (numerous product names)	—	Spray: read label carefully for crops listed and geographic location.
glyphosate (numerous product names)	—	Wiper: 23% solution
glufosinate ammonium (Rely)	Apples, hazelnuts, and walnuts	1.75-1.5 lb ai/A (3-6 qt/A Rely)
2,4-D amine (Saber, Weed-Rhap A4D, Dri-Clean Herbicide)	—	0.95-1.4 lb ae/A (2-3 pt/A Saber)
clopyralid (Stinger)	Stone fruits only	0.12-0.25 lb ae/A (0.75-0.63 pt/A Stinger)
rimsulfuron (Matrix FNV)	All fruit and nut crops	0.063 lb ai/A (4 oz/A Matrix FNV per year)
halosulfuron (Sanda)	Hazelnuts and walnuts	0.032-0.062 lb ai/A (0.66-1.33 oz/A)
fluazifop (Fusilade DX)	Bearing stone fruit	0.25-0.37 lb ai/A (16-24 oz/A Fusilade DX) Refer to specific grassy weeds listed on label.
sethoxydim (Poast)	Except prunes and plums	0.28-0.47 lb ai/A (1.5-2.5 pt/A Poast)

Grass suppression in row middles (chemical mowing)

Material	Uses	Rate
glyphosate (numerous product names)	—	Read label carefully for crops listed and geographic location.
sethoxydim (Poast)	—	0.09 lb ai/A (0.5 pt/A Poast)

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OSU Internet Resources for Plant Protection

Information regarding plant protection is available from several sources at OSU. The following listings are excellent examples:

- OSU Integrated Plant Protection Center. Online weather data and degree day information for insect pests and diseases (<http://uspest.org/wea/>)
 - Eastern filbert blight help page—all the information you need for this disease (<http://oregonstate.edu/dept/botany/epp/EFB/>)
 - Codling moth development information (<http://ippc2.orst.edu/cgi-bin/ddmodel.pl?clm>)
 - Apple scab infection season information (<http://ippc2.orst.edu/cgi-bin/ddmodel.pl?spp=asc>)
 - Pear scab infection season information (<http://ippc2.orst.edu/cgi-bin/ddmodel.pl?spp=asp>)
 - Pear scab infection period information for the Hood River Valley (<http://ippc2.orst.edu/hr/>)
 - Fire blight risk information (<http://ippc2.orst.edu/cgi-bin/ddmodel.pl?fbl>)
- Directions for the use of each model are available at each site.
- OSU Botany and Plant Pathology Department. Site of “Online Guide to Plant Disease Control.” Disease symptom descriptions, pictures of disease symptoms, and other information helpful in plant protection (<http://plant.disease.ippc.orst.edu/>)
 - Pacific Northwest Insect Management Handbook (<http://uspest.org/pnw/insects>)
 - Pacific Northwest Weed Management Handbook (<http://extension.oregonstate.edu/catalog>)

Basic Elements of Safe Pesticide Use

- Always read the label with care. This is the first step in selecting the right material for the job. Never rely on your memory. Before opening the container, pay strict attention to warnings and cautions printed on the label.
- Keep all pesticide and spray materials out of the reach of children, pets, and irresponsible persons. Storage outside of the home, away from food and feed, and under lock and key is the safest method.
- Store only in the original container and keep tightly closed.
- NEVER smoke, eat, or drink while applying pesticides.
- Avoid inhalation or direct contact. Always wear protective clothing and safety devices as recommended on the label.
- Avoid spills. If spills occur, take immediate action to remove contaminated clothing and wash thoroughly.
- After each application, bathe and change to clean clothing. Wash clothing after each use. Always use fresh clothing when starting new application.
- Avoid contamination of fish ponds and water supplies. Cover feed and water containers when treating around livestock or pet areas.
- Keep separate equipment for use with hormone-type herbicides to avoid accidental injury to susceptible plants. Also avoid applications under wind conditions that could create drift to nontarget areas.
- Rinse empty containers three times before disposing of them. Add the rinse to the spray tank and dispose of containers according to local regulations to avoid hazard to humans, animals, and the environment.
- Follow label directions for mixing and application to keep residues within the limits prescribed by law.
- Plan ahead. Discuss with your physician the materials you will be using during the season so that he or she can be prepared to provide the appropriate treatment in case of accidental exposure. If symptoms of illness occur, call the physician or get the patient to a hospital immediately. Always provide the medical personnel with as much information as possible.
- Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

Oregon Poison Center

The Oregon Health & Science University
3181 S.W. Sam Jackson Park Road, Room CB 550
Portland, OR 97239
Phone: 1-800-222-1222

If a person has collapsed or is not breathing, dial 911.

Prepared by Jeff Olsen, Extension horticulturist, Yamhill County; Jay W. Pscheidt, Extension plant pathologist; and Ed Peachey, assistant professor of weed science, Department of Horticulture, all of Oregon State University. The information in this pest management guide is valid for 2011. Trade-name products and services are mentioned as illustration only. This does not mean that the Oregon State University Extension Service either endorses these products and services or intends to discriminate against products and services not mentioned. Due to constantly changing laws and regulations, the Oregon State University Extension Service can assume no liability for the suggested use of chemicals contained in this guide. Pesticides should be applied according to the label directions on the pesticide container.

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