Oregon State University | Extension Service

Apple

2012 Pest Management Guide for the Willamette Valley

EM 8418 · Revised February 2012

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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 an 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 incompatible 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 50W, and the preharvest interval extended to 21 days.
3. Endosulfan: Preharvest intervals have changed. Maximum per-acre application rates are reduced.
4. *Orchard Pest Management, a Resource Book for the Pacific Northwest*, 1993 (edited by Beers, Brunner, Willet, and Warner, published by the Good Fruit Grower, Yakima, WA) provides a comprehensive list of the tree fruit insect and mite pests of orchards. Life histories, damage, detection, monitoring, and management of the pests are covered. It is one of our primary sources of information in developing this pest management guide and the most complete reference on orchard use of the principles of integrated pest management.

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.

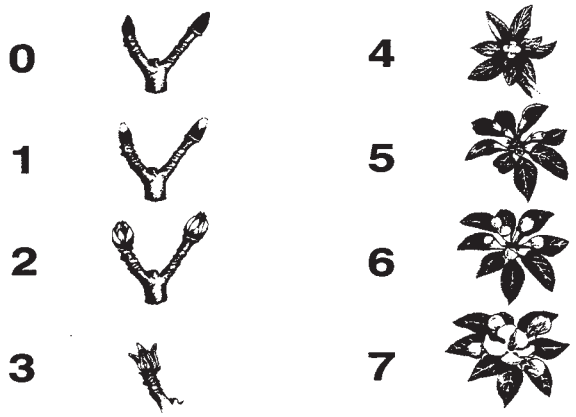
Stages

Delayed Dormant (Stages 1–2)
Prepink or Green Bud (Stages 3–4)
Pink or Preblossom (Stages 5–6)

Not shown

Calyx; Cover Sprays; Pre- or Postharvest

Illustration courtesy of Washington State University Extension.



Apple 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.

Delayed Dormant (Stages 1–2)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
European red mite eggs, scale, aphid eggs, and apple rust mite *Note:* Delayed Dormant Stage is the best time to control San Jose scale. See footnote 1, page 9.		
Horticultural mineral oil (HMO) + one of the following:	4–8 gal	6-hour reentry.
diazinon 50W	4 lb	Limited to 2 applications per season. 24-hour reentry.
lime sulfur (Ca polysulfides 29%)	5–10 gal	2-day reentry.
Lorsban 4EC	4 pt	Do not use the EC formulation of Lorsban after the delayed dormant period. 24-hour reentry.
Supracide 2E	8 pt	Detrimental to predatory mites with this timing. Do not use Supracide after the delayed dormant period. 2- to 14-day reentry.
Crown and collar rot *Note:* Aliette, Agri-Fos, Fosphite, and Phostrol also registered but may be more useful in the fall.		
Ridomil Gold SL	0.5 pt/ 100 gal water	Rates are based on tree size. Have rain or irrigation move material into root zone. 48-hour reentry.

Prepink or Green Bud (Stages 3–4—little leaves separating just enough to expose blossom bud cluster)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Scab (see footnote 5 and footnote 6, page 9, and Table 1, page 10)		
Adament 50WG	4–5 oz	Group 3 + 11 fungicide. 12-hour reentry. **75-day PHI**.
Captan 80WDG	2.5–5 lb	See footnote 3, page 9. 24-hour reentry. **0-day PHI**.
Flint 50WG	2–2.5 oz	12-hour reentry. **14-day PHI**.
Indar 2F	6–8 fl oz	Add a wetting agent. 12-hour reentry. **14-day PHI**.
Inspire Super	8.5–12 fl oz	Group 3 + 9 fungicide. 12-hour reentry. **14-day PHI**.
mancozeb	6 lb	Do not use this rate beyond bloom. 24-hour reentry. **77-day PHI**.
Polyram 80DF	6 lb	Do not use this rate beyond bloom. 24-hour reentry. **77-day PHI**.
Pristine	14.5–18.5 oz	Group 7 + 11 fungicide. 12-hour reentry. **0-day PHI**.
Procure	8–16 fl oz	See footnote 5, page 9. Should be tank-mixed with a product that has good protection activity. 12-hour reentry. **14-day PHI**.
Rally 40WSP	5–8 oz	Do not apply more than 5 lb/A per season. Should be tank-mixed with a product that has good protection activity. 24-hour reentry. **14-day PHI**.
Rubigan EC	8–12 oz	Should be tank-mixed with a product that has good protection activity. 12-hour reentry. **30-day PHI**.
Sovran	3.2–6.4 oz	See footnote 10, page 9. 12-hour reentry. **30-day PHI**.
Sulforix	2 qt/100 gal water	See footnote 2, page 9.
Syllit FL	1.5–3 pt	See footnote 4, page 9. 2-day reentry. **7-day PHI**.
Tebuzol 45DF	4–8 oz	Group 3 fungicide. 5-day reentry. **75-day PHI**.
Topguard	8–12 fl oz	Group 3 fungicide. **Do not use an adjuvant.** 12-hour reentry. **14-day PHI**.
Powdery mildew		
Adament 50WG	4–5 oz	Group 3 + 11 fungicide. 12-hour reentry. **75-day PHI**.
Flint 50WG	2–2.5 oz	12-hour reentry. **14-day PHI**.
HMO such as JMS Stylet oil	1–2 gal/ 100 gal water	Do not use past second cover or near sulfur sprays or on wet foliage. 4-hour reentry.
Indar 2F	6–8 fl oz	Add a wetting agent. 12-hour reentry. **14-day PHI**.
Inspire Super	8.5–12 fl oz	Group 3 + 9 fungicide. 12-hour reentry. **14-day PHI**.
Ph-D WDG	6.2 oz	4-hour reentry. **0-day PHI**.
Pristine	14.5–18.5 oz	Group 7 + 11 fungicide. 12-hour reentry. **0-day PHI**.
Procure	8–16 fl oz	12-hour reentry. **14-day PHI**.
Rally 40WSP	5–10 oz	Do not exceed 5 lb/A per season. 24-hour reentry. **14-day PHI**.
Rubigan EC	8–12 oz	12-hour reentry. **30-day PHI**.
Sovran	4–6.4 oz	See footnote 10, page 9. 12-hour reentry. **30-day PHI**.
Sulforix	2 qt/100 gal water	See footnote 2, page 9.
Tebuzol 45DF	4–8 oz	Group 3 fungicide. 5-day reentry. **75-day PHI**.
Topguard	8–12 fl oz	Group 3 fungicide. **Do not use an adjuvant.** 12-hour reentry. **14-day PHI**.

Prepink or Green Bud continues on next page

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.

CONTINUED—Prepink or Green Bud (Stages 3–4—little leaves separating just enough to expose blossom bud cluster)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Green fruit worm, leafrollers, aphids, plant bugs		
Delegate	4.5–7 oz	**7-day PHI**.
endosulfan	4–5 lb	2-day reentry. **21-day PHI**. **Endosulfan use will be canceled on apples on July 30, 2015.**
Green fruitworm, leafrollers, aphids		
diazinon 50WP	4 lb	Limited to 2 applications per season. 24-hour reentry. **21-day PHI**.
Lorsban 50W	3 lb	24-hour reentry. **28-day PHI**.
Green fruitworm, leafrollers, tentiform leafminer *Note:* Tentiform leafminer is a concern only if it was a problem the previous season and low levels of parasitism were noticed.		
Altacor	2.5–4 oz	**14-day PHI**.
Delegate	4.5–7 oz	**7-day PHI**.
Imidan 70WP	3.5–5 lb	24-hour reentry. **7-day PHI**.
Proclaim 5SG	3.2–4.8 oz	**14-day PHI**.
Success 2L	6–10 oz	Do not apply more than 29 oz/A per season. **7-day PHI**.
Pink or Preblossom (Stages 5–6—just before blossoms open)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Apple rust mite		
Vendex 50WP	1–1.5 lb	2-day reentry. **14-day PHI**.
Scab and powdery mildew See materials listed for Prepink or Green Bud Stage.		
Codling moth (mating disruption) *Note:* Other products are available, but experience is limited with those products. If pest pressure is high, combine with one or more insecticides against the first generation. Treat with insecticides against the second generation if pressure remains high.		
Checkmate	200 ties	—
Isomate C+	200–400 ties	—
Isomate CTT	200 ties	—
No mate	200–400 ties	—

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Calyx (when three-fourths of petals have fallen; apply before calyx closes on central fruit cluster)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Scab (See footnote 5 and footnote 6, page 9 and Table 1, page 10)		
Adament 50WG	4–5 oz	Group 3 + 11 fungicide. 12-hour reentry. **75-day PHI**.
Captan 80WDG	2.5–5 lb	See footnote 3, page 9. 24-hour reentry. **0-day PHI**.
Flint 50WG	2–2.5 oz	12-hour reentry. **14-day PHI**.
Indar 2F	6–8 fl oz	Add a wetting agent. 12-hour reentry. **14-day PHI**.
Inspire Super	8.5–12 fl oz	Group 3 + 9 fungicide. 12-hour reentry. **14-day PHI**.
mancozeb	3 lb	24-hour reentry. **77-day PHI**.
Polyram 80DF	3 lb	24-hour reentry. **77-day PHI**.
Pristine	14.5–18.5 oz	Group 7 + 11 fungicide. 12-hour reentry. **0-day PHI**.
Procure	8–16 fl oz	12-hour reentry. **14-day PHI**.
Rally 40WSP	5–8 oz	Do not apply more than 5 lb/A per season. Should be tank-mixed with a product that has good protection activity. 24-hour reentry. **14-day PHI**.
Rubigan EC	8–12 oz	Should be tank-mixed with a product that has good protection activity. 12-hour reentry. **30-day PHI**.
Scala SC	5–10 oz	Tank-mix with another fungicide and use after bloom. 12-hour reentry. **72-day PHI**.
Sovran	3.2–6.4 oz	See footnote 10, page 9. 12-hour reentry. **30-day PHI**.
Sulforix	2 qt/100 gal water	See footnote 2, page 9.
Syllit FL	1.5–3 pt	See footnote 4, page 9. 2-day reentry. **7-day PHI**.
Tebuzol 45DF	4–8 oz	Group 3 fungicide. 5-day reentry. **75-day PHI**.
Topguard	8–12 fl oz	Group 3 fungicide. **Do not use an adjuvant.** 12-hour reentry. **14-day PHI**.
Ziram 76DF	6 lb	2-day reentry. **14-day PHI**.

Calyx continues on next page

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CONTINUED—Calyx (when three-fourths of petals have fallen; apply before calyx closes on central fruit cluster)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Powdery mildew		
Adament 50WG	4–5 oz	Group 3 + 11 fungicide. 12-hour reentry. **75-day PHI**.
Flint 50WG	2–2.5 oz	12-hour reentry. **14-day PHI**.
Indar 2F	6–8 fl oz	Add a wetting agent. 12-hour reentry. **14-day PHI**.
Inspire Super	8.5–12 fl oz	Group 3 + 9 fungicide. 12-hour reentry. **14-day PHI**.
JMS Stylet oil	1–2 gal/ 100 gal water	Do not use past second cover or near sulfur sprays or on wet foliage. 4-hour reentry.
Ph-D WDG	6.2 oz	4-hour reentry. **0-day PHI**.
Pristine	14.5–18.5 oz	Group 7 + 11 fungicide. 12-hour reentry. **0-day PHI**.
Procure	8–16 fl oz	12-hour reentry. **14-day PHI**.
Rally 40WSP	5–10 oz	Do not apply more than 5 lb/A per season. 24-hour reentry. **14-day PHI**.
Rubigan EC	9–12 oz	Should be tank-mixed with a product that has good protection activity. 12-hour reentry. **30-day PHI**.
Sovran	4–6.4 oz	See footnote 10, page 9. 12-hour reentry. **30-day PHI**.
Sulforix	2 qt/100 gal water	See footnote 2, page 9.
Tebuzol 45DF	4–8 oz	Group 3 fungicide. 5-day reentry. **75-day PHI**.
Topguard	8–12 fl oz	Group 3 fungicide. **Do not use an adjuvant.** 12-hour reentry. **14-day PHI**.

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.

Cover Sprays (1–4 cover sprays may be needed)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Codling moth, leafrollers		
Altacor	2.5–4 oz	**5-day PHI**.
Assail 70W	3.4 oz	**7-day PHI**.
Avaunt 30WG	6 oz	**28-day PHI**.
azinphos-methyl 50WSB (Guthion)	2–3 lb	Allow 7 days between applications. Do not apply more than 12 lb/A per season. See footnote 7, page 9. 2- to 14-day reentry. **14- to 21-day PHI**.
Belt SC	5 oz	**14-day PHI**.
Calypso 4F	2–4 oz	**30-day PHI**.
Danitol 2.4EC	16–21.3 oz	**14-day PHI**.
Delegate	6–7 oz	**7-day PHI**.
diazinon 50WP	4 lb	Do not apply more than 4 lb per application or more than 12 lb per season. 24-hour reentry. **21-day PHI**.
Esteem 35WP	4–5 lb	The addition of 1% horticultural mineral oil has been shown to increase codling moth control of Esteem. **45-day PHI**.
Imidan 70WP	4–5 lb	A water-soluble bag formulation (70WSB) also is available. 24-hour reentry. **7-day PHI**.
Intrepid 2F	16 oz	For use against low to moderate pest pressure situations. **14-day PHI**.
Proclaim 5SG	3.2–4.8 oz	**14-day PHI**.
Rimon 0.83EC	30–50 oz	See label for timing. **14-day PHI**.
Codling moth, aphids, leafrollers, scale crawlers		
diazinon 50WP	4 lb	24-hour reentry. **21-day PHI**.
White apple leafhopper		
Actara	2–2.75 oz	**35-day PHI**.
Assail 70WP	1.1–1.7 oz	**7-day PHI**.
endosulfan 50WP	4–5 lb	Do not exceed 2 applications per year or a maximum of 6 lb/A per season. See footnote 8, page 9. 2-day reentry. **21-day PHI**. **Endosulfan use will be canceled on apples on July 30, 2015**.
Provado 1.6F	4–8 oz	**7-day PHI**.
Mites		
Acramite 50WS	0.75–1 lb	12-hour reentry. **7-day PHI**.
Apollo 50SC	4–8 oz	Apply only once per season. Will not control rust mites. **45-day PHI**.
Envidor 2SC	16–18 oz	Apply only once per season. **7-day PHI**.
FujiMite 5EC	32 oz	Do not apply more than twice per season. **14-day PHI**.
Kanemite 50WSP	4 lb	**7-day PHI**.
Onager	12–24 oz	**28-day PHI**.
Vendex 50WP	1–2 lb	2-day reentry. **14-day PHI**.
Zeal 72WDG	2–3 oz	Apply only once per season. **28-day PHI**.

Cover Sprays continues on next page

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CONTINUED—Cover Sprays (1–4 cover sprays may be needed)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Bull's eye rot and scab		
Captan 80WDG	2.5–5 lb	24-hour reentry. **0-day PHI**.
mancozeb	3 lb	24-hour reentry. **77-day PHI**.
Ziram 76DF	6 lb	2-day reentry. **14-day PHI**.
Scab and powdery mildew *Note:* See materials listed for Calyx Stage. Apply scab sprays before wet weather is expected to occur and stop when dry weather prevails. Powdery mildew sprays can be stopped when terminal growth stops.		
Anthracnose *Note:* Scout for cankers in trees. Remove and destroy cankers during dry weather.		
Apple maggot *Note:* Sprays used for codling moth will control apple maggot. However, 1 or 2 additional sprays for apple maggot may be required later in the season.		
Assail 70WP	3.4 oz	**7-day PHI**.
azinphos-methyl 50WP (Guthion Solupak) or WSB	2–3 lb	Allow 1 week between applications. Do not apply more than 12 lb/A per season. 2- to 14-day reentry. **14- to 21-day PHI**.
Belay 50WDG	3 oz	**7-day PHI**.
Delegate 25WG	6–7 oz	**7-day PHI**.
Imidan 70WP	3–5 lb	A water-soluble bag formulation (70WSB) also is available. 24-hour reentry. **7-day PHI**.

Pre- or Postharvest (before fall rains—see footnote 9, page 9)		
Pest or disease/ Material	**Amount of product per acre**	**Comments/Reentry interval/Preharvest interval (PHI)**
Anthracnose, Nectria canker, Bull's eye rot		
bordeaux 6-6-100	—	Do not use on yellow-colored cultivars before harvest.
Captan 80WDG	3.75 lb	Do not apply more than 64 lb/A per year. 24-hour reentry. **0-day PHI**.
Copper-Count-N	8–12 qt	Postharvest only. 12-hour reentry.
Cuprofix Ultra 40 Disperss	8–20 lb	Postharvest only. 48-hour reentry.
Kocide 3000	5.25–7 lb	Do not use on yellow-colored cultivars before harvest. 48-hour reentry.
Nu-Cop 50DF	12–16 lb	Do not use on yellow-colored cultivars before harvest. 24-hour reentry.
Ziram 76DF	6 lb	2-day reentry. **14-day PHI**.
Crown and collar rot *Note:* Ridomil is also registered but may be more useful in the spring.		
Agri-Fos	1.25–2.5 qt	Do not use with copper materials. 4-hour reentry.
Aliette WDG	2.5–5 lb	Do not use with copper materials. 12-hour reentry. **14-day PHI**.
Fosphite	1–3 qt	Do not use with copper materials. 4-hour reentry.
Phostrol	2.5–5 pt	4-hour reentry.

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Footnotes

1. Use oil emulsion, 3.2% actual oil, plus bordeaux 6-6-100. This spray will control all other pests listed except blister mite. Bordeaux is not compatible with lime sulfur or polysulfide.
2. Lime sulfur may injure Delicious and Delicious strains during hot weather and causes yellow foliage on Braeburn. Lime sulfur will help control apple rust mite.
3. Captan may cause minor leaf spotting to Delicious under certain conditions.
4. Syllit is not compatible with lime and should not be combined with oils or oil emulsions.
5. Apple scab forecasting is useful when spring rains become less frequent and drier weather prevails. Several materials can be applied within a certain time limit after the start of an infection period. Keep to a protection schedule throughout the bloom period. All ascospores will have matured and be ready for dispersal once 865 degree days (base 32°F) have accumulated since bud break. Group 11 materials such as Flint and Sovran claim long kickback activity. These claims are doubtful, and kickback activity may be much shorter. These materials are best used **prior** to infection periods.
6. To delay or prevent the development of resistant strains of apple scab or powdery mildew, alternate or tank-mix materials with different modes of activity (or from different fungicide groups).
7. Codling moth: spray timing. CALENDAR APPROACH: First spray at 15 to 21 days after petal fall followed by another in about 3 weeks. Third spray for second generation usually is made in early July followed by another in about 3 weeks. PHEROMONE TRAPS TO TIME SPRAYS: Mid-May place one trap for every 3 acres in upper one-third of the tree canopy. Inspect once weekly or more frequently. Make first spray when two or more moths are caught in one or more of the traps for 2 weeks in a row. Repeat spray when first application has weathered off (usually 3 weeks for azinphos methyl and Guthion) and two or more moths are caught in one or more of the traps. Spot treatments may be sufficient in parts of blocks. Continue trapping through September. DEGREE DAY ACCUMULATION: first spray at 250 degree days following first consistent catch of codling moths in pheromone traps (50°F lower threshold).
8. White apple leafhopper has become a serious problem for some growers in the Willamette Valley. It is best controlled during the first generation after egg hatch is complete but before there are a large number of mature, winged adults. Larger nymphs and adults are difficult to control. Use Thiodan 50WP around petal fall or shortly after. Note that timing of the first cover spray for codling moth may be too late to control leafhoppers. Also the commonly used codling moth insecticides are not that effective on leafhoppers. An application of Sevin (carbaryl) directed at the second-generation nymphs, which should be present in August, usually provides sufficient control of leafhoppers to prevent picker annoyance problems.DO NOT USE CARBARYL (SEVIN) DURING PETAL FALL (FIRST LEAFHOPPER SPRAY) AS FRUIT THINNING WILL OCCUR. USE THIODAN. Endosulfan use will be canceled on apples on July 30, 2015.
9. Use Captan or Ziram preharvest for control of Bull's eye rot. Focus on early- and mid-leaf fall for control of Nectria canker. Do not use Topsin as it is toxic to earthworms, which help decompose scab-infected leaves.
10. Sovran drift may injure some sweet cherry cultivars such as Van. Please be extra careful when spraying near cherry orchards.

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Table 1. Approximate Hours of Wetness at Indicated Temperatures Required for Leaf Scab Infection and Days Required for Lesions to Appear

Average temperature (°F)	Hours of wetness required for infection* From primary and secondary inoculum			Days required for lesions to appear**
	Light	Moderate	Heavy	
78	13	17	26	—
77	11	14	21	—
76	9.5	12	19	—
63–75	9	12	18	9
62	9	12	19	10
61	9	13	20	10
60	9.5	13	20	11
59	10	13	21	12
58	10	14	21	12
57	10	14	22	13
56	11	15	22	13
55	11	16	24	14
54	11.5	16	24	14
53	12	17	25	15
52	12	18	26	15
51	13	18	27	16
50	14	19	29	16
49	14.5	20	30	17
48	15	20	30	17
47	15	23	35	—
46	16	24	37	—
45	17	26	40	—
44	19	28	43	—
43	21	30	47	—
42	23	33	50	—
41	26	37	53	—
40	29	41	56	—
39	33	45	60	—
38	37	50	64	—
37	41	55	68	—
33–36	48	72	96	—

From W.D. Mills, Cornell University.

*Leaves remain wet for varying lengths of time after the rain stops, depending on conditions. Add together wetting periods from intermittent showers. Add together any wet periods with less than 8 hours dry time between them. Determine average temperature for the period from hourly readings. Lesions may not be apparent for 2–4 weeks.

**Days required for conidia to appear once infection has been established. No further wetting is required. For this column, daily maximum and minimum temperatures are adequate for determining the average.

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Table 2. Effectiveness of Fungicides for Apple Disease Management*

Fungicide	Fungicide group #	Apple scab	Powdery mildew	Bull's eye rot
Adament	3 + 11	Excellent	Excellent	??
Captan	M4	Excellent	None	Good
Flint	11	Excellent**	Good–Excellent**	Slight–Fair
HMO***	Not classified	??	Good	??
Indar	3	Good**	Excellent**	??
Kaligreen	Not classified	None	Slight–Fair	??
Lime sulfur	M2	Excellent	Good	??
Mancozeb	M3	Good	None	Slight–Fair
Ph-D	19	??	Fair–Good	??
Polyram	M3	Good	None	??
Pristine	7 + 11	Good–Excellent**	Excellent**	Good
Procure	3	Good**	Excellent**	Slight–Fair
Rally	3	Good**	Fair–Good	??
Rubigan	3	Good**	Excellent**	??
Scala	9	Fair	None	??
Sovran	11	Excellent**	Good–Excellent**	??
Sulfur	M2	Fair	Good	??
Syllit	M7	Good**	None	??
Tebuzol	3	Good**	Excellent**	??
Topguard	3	Good**	Excellent**	??
Topsin	1	Fair**	Fair–Good**	Excellent**
Vangard	9	Fair**	None	??
Ziram	M3	Fair	None	Fair–Good

*These ratings are relative rankings based on labeled 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.

**Resistant pathogens will lower the effectiveness of these fungicides.

***Horticultural mineral oil.

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.

For more information about fungicides registered for use on apples and their specific modes of action, consult OSU Extension publication EM 8950: *How to Reduce the Risk of Pesticide Resistance in Apple Pests in Oregon*.

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 print or online (*http://pnwhandbooks.org/weed/*). 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 10-G)
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 broadleaf weeds.
isoxaben (Gallery or Gallery T & V)	Nonbearing crop only, except chestnuts	0.5–1 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)
clethodim (Envoy, Prism, 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 H2O: 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.
indaziflam (Alion)	Except chestnuts	0.065–0.085 lb ai/A (5–6.5 oz/A product) depending on soil texture
isoxaben (Trellis)	Bearing nuts and vineyards	0.495–0.998 lb ai/A (0.66–1.33 lb/A product)
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; 2–4 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	2–6 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: 33% solution
glufosinate ammonium (Rely)	Apples, hazelnuts, and walnuts	0.75–1.5 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 (0.33–0.66 pt/A Stinger)
rimsulfuron (Matrix FNV)	All fruit and nut crops	0.063 lb ai/A (4 oz/A Matrix FNV per year)
halosulfuron (Sandea)	Apples, hazelnuts, and walnuts	Apples: 0.035–0.094 lb ai/A (0.75–2 oz/A)
		Nut crops: 0.031–0.063 lb ai/A (⅔–1 ⅓ oz/A)
clethodim (Select Max, Arrow)	Peaches only	0.068–0.121 lb ai/A (9–16 oz/A Select Max); 0.094–0.125 lb ai/A (6–8 oz/A Arrow)
fluazifop (Fusilade DX)	Bearing stone fruits	0.25–0.375 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.
- Pacific Northwest Plant Disease Management Handbook (*http://pnwhandbooks.org/plantdisease*)
- Pacific Northwest Insect Management Handbook (*http://pnwhandbooks.org/insect*)
- Pacific Northwest Weed Management Handbook (*http://pnwhandbooks.org/weed*)

Oregon Poison Center
The Oregon Health & Science University
3181 S.W. Sam Jackson Park Road
Portland, OR 97239
Phone: 1-800-222-1222
If a person has collapsed or is not breathing, dial 911.

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.

Prepared by Jeff Olsen, Extension horticulturist, Yamhill County; Jay W. Pscheidt, Extension plant pathology specialist; 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 2012. Trade-name products and services are mentioned as illustrations 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.

Revised February 2012.

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