

Hazelnut

2008 Pest Management Guide for the Willamette Valley

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.

Also:

1. Make sure any tank mixes of pesticides are compatible. For example, the elevated pH of some boron spray solutions weakens many insecticides.
2. Use adjuvants and spreader stickers with caution.

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

Seasons

Dormant season (stages 1-2)

Stage 1a—Flowering. Female stigmas outside buds.

Stage 1b—Flowering. Male catkins just before elongation and pollen shed

Stage 2—Dormant buds.

Mid-March (budbreak) (stages 3-5)

Stage 3—Bud swelling.

Stage 4—Bud break. Green leaf tips showing.

Stage 5—Advanced bud break. Highly susceptible to Eastern filbert blight.

March-April

Stage 6—Early shoot elongation. First leaves fully open.

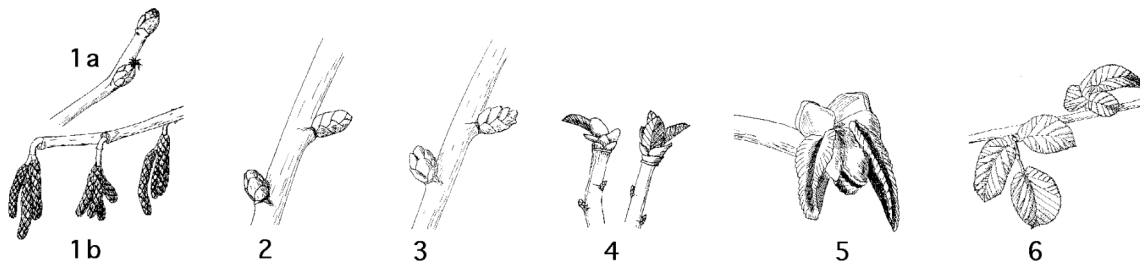
Not shown

April-May

May-June

July-August

Late August-September



Hazelnut 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 Season—Stages 1-2

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Eastern filbert blight none	—	Scout orchards and remove and destroy all cankered wood prior to budbreak.

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Mid-March (budbreak)—Stages 3-5 (See footnote 5 for nonbearing trees.)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Eastern filbert blight (See footnote 6.)		
Abound	12 fl oz	Group 11 fungicide. Use on a 10-day schedule. 4-hour reentry. 45-day PHI.
bordeaux 6-6-100	—	Group M1 fungicide. See footnote 2. 24-hour reentry.
Bravo Weather Stik	4 pt	Group M5 fungicide. Spray at budbreak. Spray again at 2-week intervals. 12-hour reentry. 120-day PHI.
Cabrio EG	9.5 oz	Group 11 fungicide. Use with a spreader sticker. Do not use more than 2 consecutive applications. 12-hour reentry.
Champion WP	16-24 lb	Group M1 fungicide. Add 1 pt horticultural mineral oil (HMO) per 100 gal of water. 24-hour reentry.
Copper-Count-N	10-12 qt	Group M1 fungicide. 12-hour reentry.
Echo 720	4 pt	Group M5 fungicide. Spray at budbreak. Spray again at 2-week intervals. 12-hour reentry. 120-day PHI.
Gem	4-8 oz	Group 11 fungicide. Do not use within 60 days of harvest. Do not use more than 16 oz/acre/season. 12-hour reentry.
Kocide 2000	12-18 lb	Group M1 fungicide. Add 1 pt HMO per 100 gal of water. 24-hour reentry.
NuCop 50DF	16-24 lb	Group M1 fungicide. Add 1 pt HMO per 100 gal of water. 24-hour reentry.
Orbit	5-8 fl oz	Group 3 fungicide. Spray at budbreak and again at 2-week intervals. See footnote 7. 24-hour reentry.
Procure 480SC	4-6 fl oz	Group 3 fungicide. 12-hour reentry. 18-day PHI.
Tilt	5-8 fl oz	Group 3 fungicide. Spray at budbreak and again at 2-week intervals. See footnote 7. 12-hour reentry.

March-April

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Big bud mite		
endosulfan 50WP	3 lb	Apply when mites begin to migrate from infested buds. See footnote 3. Extremely toxic to earthworms. 40- to 72-hour reentry. 1-day PHI.
Envidor 2SC	16-18 oz	Only 1 application per season. 7-day PHI.
Lime sulfur (BSP)	12 gal	48-hour reentry.
Pyramite	4.4-13.2 oz	Apply when mites begin to migrate from infested buds. 12-hour reentry. 7-day PHI.
Sulforix (BSP)	3 gal	Apply in a dilute spray mid- to late April for most varieties and locations. 48-hour reentry.

Winter moth, omnivorous leaftier

Note: Both may damage young trees by feeding on developing buds. Because of the early timing for this spray, application of these chemicals now may not adequately control filbert and obliquebanded leafrollers, which become active slightly later.

Lorsban 50WP or	3-4 lb	No more than 3 applications per season. Do not graze livestock in treated orchards. 24-hour reentry. 14-day PHI.
Lorsban 4E	3-4 pt	

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Stage 6—early shoot elongation

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Eastern filbert blight (See footnote 6.)		
Abound	12 fl oz	Group 11 fungicide. Use on a 10-day schedule. 4-hour reentry. 45-day PHI.
bordeaux 6-6-100	—	Group M1 fungicide. This rate of bordeaux is high and may cause leaves to burn, especially if mixed improperly. See footnote 3. 24-hour reentry.
Bravo Weather Stik	4 pt	Group M5 fungicide. Spray at 2-week intervals after budbreak. 12-hour reentry. 120-day PHI
Cabrio EG	9.5 oz	Group 11 fungicide. Do not use more than 2 consecutive applications. 12-hour reentry.
Champion WP	16-24 lb	Group M1 fungicide. Add 1 pt horticultural mineral oil (HMO) per 100 gal water. 24-hour reentry.
Copper-Count-N	10-12 qt	Group M1 fungicide. 12-hour reentry.
Echo 720	4 pt	Group M5 fungicide. Spray at budbreak. Spray again at 2-week intervals. 12-hour reentry. 120-day PHI.
Gem	4-8 oz	Group 11 fungicide. Do not use within 60 days of harvest. Do not use more than 16 oz/acre/season. 12-hour reentry.
Kocide 2000	12-18 lb	Group M1 fungicide. Add 1 pt HMO per 100 gal water. 24-hour reentry.
NuCop 50DF	16-24 lb	Group M1 fungicide. Add 1 pt HMO per 100 gal water. 24-hour reentry.
Orbit	5-8 fl oz	Group 3 fungicide. Spray at budbreak and again at 2-week intervals. footnote 7. 24-hour reentry.
Procure 480SC	4-6 fl oz	Group 3 fungicide. 12-hour reentry. 18-day PHI.
Tilt	5-8 fl oz	Group 3 fungicide. Spray at budbreak and again at 2-week intervals. footnote 7. 12-hour reentry.

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April-May

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Filbert leafroller		
<i>Note:</i> Filbert leafroller eggs hatch in late March and early April during warm weather.		
Ambush 2E	13-25 oz	Do not graze treated orchards. Do not apply more than 1.6 lb ai/A per season. 24-hour reentry. 14-day PHI.
Asana XL	10-16 oz	Do not apply a second spray within 3 weeks of the first. Do not apply more than 0.2 lb ai/A per season. Do not graze livestock in treated orchards. 24-hour reentry. 21-day PHI.
Azadirachtin (Azatin XL Plus)	11-21 oz	Botanical extract of the neem tree. 4-hr reentry. 0-day PHI.
<i>Bacillus thuringiensis (Bt)</i>	1 lb	Time sprays at earliest detected presence of larvae. Apply with a sticker.
Brigade WSB	0.05-0.2 lb ai/acre	7-day PHI.
Cobalt	26-57 oz	14-day PHI.
Diazinon 500AG	1-2 qt	Apply in dilute spray. Only 1 application per season. 21-day PHI.
Dimilin 2L	8-16 oz	Use a minimum of 50 gal water/A. Can use up to 4 applications per season (64 fl oz maximum per season. 12-hour reentry. 28-day PHI.
Intrepid	8-16 oz	Apply at or just prior to egg hatch. 14-day PHI.
Lorsban 50W or Lorsban 4E	3-4 lb 3-4 pt	No more than 3 applications per season. Do not graze treated orchards. 24-hour reentry. 14-day PHI.
Pounce 3.2E	8-16 oz	Do not graze treated orchards. Do not apply more than 1.6 lb ai/A per season. 24-hour reentry. 14-day PHI.
Sevin XLR Plus	2-5 qt	May cause rapid increase of aphid populations 3-4 weeks after application. 4F and 80S formulations also available. 12-hr reentry. 14-day PHI.
Success 2L	4-10 oz	Entrust is the organic formulation. 14-day PHI.
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Filbert aphid, hazelnut aphid		
Diazinon 500AG	1-2 qt	Apply in dilute spray. No more than 1 application per season. 21-day PHI.
Leverage 2.7	3.8-5.1 oz	Baythroid and Provado combination. 14-day PHI.
Lorsban 50W or Lorsban 4E	3-4 lb 3-4 pt	No more than 3 applications per season. Do not graze livestock in treated orchards. 24-hour reentry. Determine whether aphid parasite is present in your orchard. An aphid spray might not be necessary. 14-day PHI.
Provado 1.6	3.5-7.0 oz	7-day PHI.
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Omnivorous leaftier, winter moth (if present)		
<i>Note:</i> Primarily pests during orchard establishment.		
Lorsban 50W	3-4 lb	Do not graze livestock in treated orchards. 24-hour reentry. 14-day PHI.
Sevin XLR Plus (carbaryl)	2-5 qt	4F, 50W, and 80S formulations also available. 12-hr reentry. 14-day PHI.

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May-June

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
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To increase nut set

Note: These are rates for foliar-applied sprays. Consult labels for soil-applied rates. For maximum effect, apply boron from mid- to late May. Do not tank mix with insecticides.

Borosol 10	1-3 pt	—
Solubor	5 lb	—

Obliquebanded leafroller

Note: Larvae cause damage by feeding between husk and nut. Inspect under husks for larvae between mid-June and late July. Leafrolling minimal to nonexistent at this time.

Brigade, *Bt*, Sevin, Asana, Ambush, and Pounce also labeled for leafroller and filbertworm control. Lorsban has given best control of larvae feeding between husk and nut.

Cobalt	26-57 oz	14-day PHI.
Diazinon 500AG	1-2 qt	Apply in dilute spray. 21-day PHI.
Dimilin 2L	8-16 oz	Use a minimum of 50 gal water/A. Can use up to 4 applications per season (64 fl oz maximum per season. 12-hour reentry. 28-day PHI.
Lorsban 50W or Lorsban 4E	3-4 lb 3-4 pt	No more than 3 applications per season. Do not graze livestock in treated orchards. 24-hour reentry. 14-day PHI.
Success 2L	4-10 oz	14-day PHI.

Spider mites, rust mites

Note: Look for webbing and brown discoloration on the underside of leaves during the summer.

Acramite 50WS	0.75-1.0 lb	Use only once per season. 12-hour reentry. 14-day PHI.
Envidor 2 SC	16-18 oz	7-day PHI.
Nexter	10.67 oz	Do not exceed 2 applications per season. 7-day PHI.
Savey 50DF	3-6 oz	Does not control adult rust mites. 28-day PHI.
Zeal	2-3 oz	One application per season. 28-day PHI.

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July-August

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Filbertworm		
<i>Note:</i> Lorsban and Sevin also are registered for filbertworm. See footnote 4 on use of pheromone traps.		
Ambush 2E	13-25 oz	Do not graze treated orchards. Do not apply more than 1.6 lb ai/A per season. 24-hour reentry. 14-day PHI.
Asana XL	10-18 oz	Do not apply a second spray within 3 weeks of the first. Do not apply more than 0.2 lb ai/A per season. Do not graze livestock in treated orchards. 24-hour reentry. 21-day PHI.
Baythroid 2	2.0-2.4 oz	14-day PHI.
Brigade WSP	0.05-0.20 active/acre	7-day PHI.
Confirm 2F	up to 30 oz	Apply at or just prior to initiation of egg hatch. 14-day PHI.
Dimilin 2L	12-16 oz	Apply at or just prior to egg hatch.
Esteem	13-16 oz	Do not use more than twice per season. 21-day PHI.
Intrepid 2F	8-16 oz	Apply at or just prior to egg hatch. 14-day PHI.
Leverage 2.7	3.8-5.1 oz	Baythroid and Provado combination. 14-day PHI.
Pounce 3.2E	8-16 oz	Do not graze livestock in treated orchards. Do not apply more than 1.6 lb ai/A per season. 24-hour reentry. 14-day PHI.
Success 2L	4-10 oz	Entrust is the organic formulation. 14-day PHI.

Eastern filbert blight

none	—	Scout orchards and remove and destroy all infected wood prior to budbreak.
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Late August-September

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Bacterial blight		
<i>Note:</i> An important spray for young filberts (less than 10 years old). Apply coppers after harvest and before fall rains. If heavy rains occur, repeat application when three-fourths of the leaves have dropped. See footnote 2.		
bordeaux 6-3-100	—	24-hour reentry.
Champion WP	16-24 lb	Add 1 pt horticultural mineral oil (HMO) per 100 gal water. 24-hour reentry.
C-O-C-S WDG	12-16 lb	Add 1 pt HMO per 100 gal water.
Copper-Count-N	10-12 qt	12-hour reentry.
Cuprofix Disperss	20-30 lb	24-hour reentry.
Kocide 2000	12-18 lb	Add 1 pt HMO per 100 gal water. 24-hour reentry.
Nordox 75	8-13 lb	24-hour reentry.
NuCop 50DF	16-24 lb	Add 1 pt HMO per 100 gal water. 24-hour reentry.

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

Footnotes

1. More than one type of formulation is available for most insecticides. For instance, Lorsban is marketed as a 50% wettable powder (Lorsban 50WP) as well as an emulsifiable concentrate (Lorsban 4E). Lower rates can be used on smaller trees.
2. Thoroughly spray the trunks and lower scaffolds as well as upper branches. Bordeaux 6-6-100 means 6 pounds of copper sulfate plus 6 pounds of hydrated lime in 100 gallons of water. In any bordeaux formula, the ingredients always are listed in the same order—copper sulfate, hydrated lime, then gallons of water.
3. The time to apply insecticide for big bud mite is from early to mid-April depending on the year, orchard location, and weather. Use a 20x hand lens or microscope to determine whether mites are migrating from blasted buds to new buds. Tanglefoot, Stickem Special, vaseline, or duct tape applied in bands above and below buds infested with big bud mite will trap and hold mites migrating to new buds. Beginning in late March, inspect weekly for migrating mites. Complete spray coverage is necessary to control this mite. Use no less than 25 gal water per acre (100 gal is a better rate). Do not graze livestock in treated orchards. Thiodan will suppress light populations of winter moth at this time. *Note:* Thiodan drift to the orchard floor kills earthworms. Sulforix has a negligible impact.
4. Pheromone traps are available to detect and monitor flight activity of filbertworm moths. They have been successfully used to time cover sprays. Apply insecticides 8-12 days after filbertworm moths emerge in your area. A second application usually is necessary in 2-3 weeks. A repeat spray may be necessary if heavy rainfall occurs a day or two after application and the label allows it. Second and third sprays may be necessary and should be made if pheromone traps continue to catch moths 2-3 weeks after a spray. If pheromone traps are being used in an orchard block to time filbertworm sprays, place traps in the upper third of the tree canopy in early June. Spray when 2-3 moths are collected per trap or if any one trap has caught 5 moths. See also Table 1.
5. **For nonbearing trees only.** Nonbearing is defined as trees that will not produce a harvestable crop within 12 months after the last application.
 - o Rubigan EC at 4-8 fl oz/A. Not to be used on nonbearing trees interplanted in bearing orchards. **Oregon only.** SLN OR-030037. 12-hour reentry
6. All fungicides should be applied beginning or just before budbreak. Continue applications at 2-week intervals to cover an 8-week susceptibility period (4 applications total).
7. Orbit or Tilt applications may result in smaller, thicker, greener leaves and shortened internodes, but trees will grow out of this condition within 2 weeks of the last application. Has eradicator activity if applied at higher rates within 72 hours of infection.

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Table 1. Hazelnut IPM Sampling Methods and Action Thresholds

Insect	Sampling Period	Sampling Method	Action Threshold
European winter moth	Larvae: March 15-May 31	3 terminals/tree and 3 leaf clusters/terminal. Each terminal is a sampling unit.	20% infestation
Big bud mite	April	In mid-April, place Tanglefoot on twigs surrounding blasted buds. Check for extremely small, white, cigar-shaped mites with a 20x hand lens.	When consistent mite movement is observed, which usually occurs with bud break.
Omnivorous leaf-tier	April 15-June	3 bud clusters per tree	5% infestation
Filbert aphid	April 1-September 30	3 terminals per tree—newest fully expanded leaf on each terminal	April—20/leaf May—30/leaf June—40/leaf July—40/leaf with an increasing population.
OBLR and filbert leafroller	Larvae: April-August Adult: Mid-May to Sept.	Larvae: 3 terminals per tree and 3 leaf clusters per terminal. Each terminal is a sampling unit. Adult: pheromone trap for each 5 acres. 6' height.	Larvae: 20-25% infestation. Adult: 40 moths per week and find larvae feeding on nuts.
Filbertworm	June-September	Adult: pheromone traps—4 for first 10 acres and one for each additional 4 acres. Place traps in the upper one-third of the canopy by mid-June.	2-3 moths per trap or 5 moths in any one trap

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://ippc2.orst.edu/wea/index.html>)
- 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?fb1>)

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://ipmnet.org/plant-disease/>)
- Pacific Northwest Insect Management Handbook (<http://pnwpest.org/pnw/insects>)
- Pacific Northwest Weed Management Handbook (<http://pnwpest.org/pnw/weeds>)

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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 Sciences University

3181 S.W. Sam Jackson Park Road, Room CB 550

Portland, OR 97201

Phone: 503-494-8968; Oregon Toll Free: 1-800-452-7165; Nationwide: 1-800-222-1222

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

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