

Walnut

2017 Pest Management Guide for the Willamette Valley

EM 8421 · Revised April 2017

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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 cultivar, 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. Less material may be needed (than that given) for 1- to 4-year-old orchards, and 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.

Important information

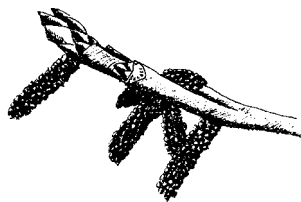
Blackline of walnuts is a serious disease that can't be controlled by use of pesticides. For more information, see EM 8907, *Growing Walnuts in Oregon*. Order from Publication Orders, Extension & Station Communications, Oregon State University, 422 Kerr Administration, Corvallis, OR 97331-2119 (puborders@oregonstate.edu; 800-561-6719 or 541-737-2513).

Stages

Early Prebloom
Late Prebloom
Postbloom

Not shown

June–July; July–August



Early Prebloom



Late Prebloom



Postbloom

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.

Walnut 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.

Early Prebloom (late March to early April, when catkins begin to enlarge)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Blight and downy leaf spot		
Badge X2	3.5–11 lb	48-hour reentry.
Bordeaux 4-2-100	—	The low-lime formula reduces the possibility of bordeaux foliage injury. See footnote 2, page 6.
C-O-C-S WDG	4–7.7 lb	48-hour reentry.
Copper-Count-N	8–12 qt	48-hour reentry.
Cuprofix Ultra 40 Disperss	5–10 lb	48-hour reentry.
Dithane F45	1.8 qt	Group M3 fungicide. See footnote 4, page 6. Label indicates you must tank-mix with a fixed copper product. 24-hour reentry. 75-day PHI.
Kocide 3000	3.5–7 lb	48-hour reentry.
Manzate Pro-Stick	2.4 lb	Group M3 fungicide. See footnote 4, page 6. Label indicates you must tank-mix with a fixed copper product. 24-hour reentry. 75-day PHI.
Nordox 75 WG	5–8 lb	12-hour reentry
Nu-Cop 50DF	4–8 lb	48-hour reentry.
Python 27 AG	30–50 fl oz/ 100 gal water	48-hour reentry.
Previsto	2–4 qt	48-hour reentry.
Regalia	1–4 qt	Use with a surfactant and on 7-day intervals. 4-hour reentry.

Late Prebloom (early to mid-May, when shoots begin to expand)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Anthraco		
<i>Note:</i> Many of these chemicals have received registration for the nut crop group, may be efficacious, and are legal to use on walnut; however, most have not been tested for efficacy against anthracnose. Tank mix or alternate chemicals to prevent fungi from developing resistance. Limit the use of any one group during crop production.		
Aframe Plus	14–21 fl oz	Group 3+11 fungicide. See footnote 6, page 6. 12-hour reentry. 60-day PHI.
Gem 500SC	1.9–3.8 oz	12-hour reentry.
Luna Experience	8.8–17 fl oz	Group 3 + 7 fungicide. 12-hour reentry. 35-day PHI.
Luna Sensation	5.6–7.6 fl oz	Group 7 + 11 fungicide. 12-hour reentry. 60-day PHI.
Merivon	5–6.5 fl oz	Group 7 + 11 fungicide. Do not use with EC or oil-based products. 12-hour reentry. 14-day PHI.
Pristine	10.5–14.5 oz	Group 7 + 11 fungicide. 12-hour reentry. 14-day PHI.

Late Prebloom continues on next page

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CONTINUED—Late Prebloom (early to mid-May, when shoots begin to expand)

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Anthracnose (continued)		
Quadris Top	12–14 fl oz	Group 3 + 11 fungicide. See footnote 6, page 6. 12-hour reentry. 45-day PHI.
Quash	3.5 oz	Group 3 fungicide. 12-hour reentry. 25-day PHI.
Quilt Xcel	14–21 oz	Group 3 + 11 fungicide. See footnote 6, page 6. 12-hour reentry. 60-day PHI.
Syllit FL	3 pt	48-hour reentry. 7-day PHI.
Tilt	4–8 fl oz	12-hour reentry. 60-day PHI.
Topguard EQ	5–8 fl oz	Do not use with silicone surfactants. Group 3 + 11 fungicide. 12-hr reentry. 45-day PHI.
Willowood Azoxy 2SC	12 fl oz	Group 11 fungicide. See footnote 6, page 6. 4-hour reentry. 45-day PHI.

Blight

See materials listed for Early Prebloom Stage.

Postbloom (late May)

Pest or disease/ Material	Active ingredient (AI)	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Blight			
See materials listed for Early Prebloom Stage.			

June–July

Pest or disease/ Material	Active ingredient (AI)	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Aphids			
<i>Note:</i> When possible, rely on biological control from the aphid parasitoid <i>Trioxys pallidus</i> or reduced-risk materials.			
Admire Pro	Imidacloprid	1.2–2.4 oz	Group 4A insecticide. Soil application allowed, but rates and restrictions differ; see label. Generic labels available. 12-hour reentry. 7-day PHI.
Asana XL	Esfenvalerate	9.6–19.2 oz	Group 3A insecticide. Restricted use. 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.
Assail 70WP	Acetamiprid	1.1–4.1 oz	Group 4A insecticide. The higher rate may be needed for control in mature orchards with full canopies. No more than 4 applications per season. 12-hour reentry. 14-day PHI.
Brigade WSB	Bifenthrin	8–32 oz	Group 3A insecticide. Restricted use. Do not graze livestock on treated cover crops. Highly toxic to bees and toxic to fish and aquatic invertebrates. 12-hour reentry. 7-day PHI.
Cobalt	Chlorpyrifos + lambda-cyhalothrin	22–57 oz	Group 1B + 3A insecticide. Restricted use. Premix product, see label as both AIs have cumulative limits/season. 24-hour reentry. 14-day PHI.

June–July continues on next page

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Pest or disease/ Material	Active ingredient (AI)	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Aphids (continued)			
Esteem 35WP	Pyriproxyfen	4–5 oz	Group 7A insecticide, Do not exceed 2 applications or 10 oz per season. 12-hour reentry. 21-day PHI.
Insecticidal soap (M-Pede)	Potassium salts of fatty acids	2% by volume	OMRI listed for organic use. 0-day PHI.
Malathion 5 EC	Malathion	See labels. (1.5–4 pt)	See footnote 1, page 6. Group 1B insecticide. 24-hour reentry. 7-day PHI.
Movento	Spirotetramat	6–9 oz	Group 23 insecticide. Toxic to aquatic organisms. Minimum interval between treatments is 14 days. Limited to 21.5 oz per year. 24-hour reentry. 7-day PHI.
Supracide 2E	Methidathion	1–2 pt as dilute spray, 4–8 pt as concentrate spray	See footnote 1, page 6. Group 1B insecticide. Apply as a cover spray when aphids appear. Do not graze orchard floors. 48-hour reentry, depending on rate. 7-day PHI.
Warrior II	Lambda-cyhalothrin	1.28–2.56 oz	Group 3A insecticide. Restricted use. Generics available. Do not apply more than 0.12 lb (7.68 fl oz or 0.48 pt of product)/acre post bloom. 24-hour reentry. 12-day PHI.

Aphids, codling moth

Note: Monitor codling moth with pheromone traps beginning in June. See footnote 3, page 6.

Scales (apply when crawlers appear; chemical control of scales usually is not necessary)

Delegate WG	Spinetoram	4.5–7 oz	Group 5 insecticide. Target codling moth larvae shortly after egg hatch, approximately 220 to 250 degree days after biofix. No more than 4 applications per season. Minimum 7-day interval between applications. (Suppression of codling moth only.) 4-hour reentry. 1-day PHI.
Esteem 35 WP	Pyriproxyfen	16 fl oz	Group 7C insecticide. Thorough coverage required. Target codling moth larvae shortly after egg hatch, approximately 220 to 250 degree days after biofix. Use higher rate and more water against scale when crawlers first appear. Do not exceed 2 applications per season. 12-hour reentry. 21-day PHI.
Intrepid 2F	Methoxyfenozide	12–24 fl oz	Group 18 insecticide. Target codling moth larvae shortly after egg hatch for each generation. (Suppression of codling moth only.) 4-hour reentry. 14-day PHI.
Movento	Spirotetramat	6–9 oz	Group 23 insecticide. 14-day minimum application interval, no more than 21.5 oz/A per year. Targets scale and aphids only. 24-hour reentry. 7-day PHI.
Supracide 2E	Methidathion	1–2 pt as dilute spray, 4–8 pt as concentrate spray	See footnote 1, page 6. Group 1B insecticide. Apply as a cover spray when aphids appear. Do not graze orchard floors. 48-hour reentry, depending on rate. 7-day PHI.

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July–August

Pest or disease/ Material	Amount of product per acre	Comments/Reentry interval/Preharvest interval (PHI)
Walnut husk fly		
<i>Note:</i> : Treatments may not be required every year; monitor with yellow sticky cards or other trap. See footnote 5, page 6.		
Ambush 25W	Permethrin 12.8–25.6 oz	Group 3A insecticide. Restricted use. Do not graze treated orchards. Extremely toxic to fish and aquatic habitat. Do not apply more than 1.6 lb ai/A per season. 24-hour reentry. 14-day PHI.
Asana XL	Esfenvalerate 9.6–19.2 oz	Group 3A insecticide. Restricted use. 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.
Assail 70WP	Acetamiprid 1.1–4.1 oz	Group 4A insecticide. Apply when egg-laying females are present. No more than 4 applications per season. 12-hour reentry. 14-day PHI.
Baythroid XL	Beta-cyfluthrin 2–2.4 oz	Group 3 insecticide. Restricted use. 12-hour reentry. 14-day PHI.
Brigade WSB	Bifenthrin 8–32 oz	Group 3A insecticide. Restricted use. Do not graze livestock on treated cover crops. Highly toxic to bees. Toxic to fish and aquatic invertebrates. 12-hour reentry. 7-day PHI.
Cobalt	Chlorpyrifos + lambda-cyhalothrin 22–57 oz	Group 1B + 3A insecticide. Restricted use. Premix product; see label as both AIs have cumulative limits/season. 24-hour reentry. 14-day PHI.
Delegate WG	Spinetoram 4.5–7 oz	Group 5 insecticide. Do not apply more than 3 consecutive treatments of group 5 materials. 4-hour reentry. 1-day PHI.
GF-120 NF	Spinosad + bait compounds 10–20 oz or 1–3 oz/ tree (spot treatment)	Group 5 insecticide. Approved for organic orchards. Attracticide (bait-spray) applied as coarse droplet spray; thorough coverage is not necessary. Apply at first emergence of adult flies.
Imidan 70W	Phosmet 4.33–8.5 lb	Group 1B insecticide. Do not apply more than 5 times per season. 28-day PHI.
Lorsban 75WG/4E	Chlorpyrifos 2–2.67 lb/ 3–4 pt	Group 1B insecticide. Restricted use. No more than 3 applications per season. Do not graze livestock in treated orchards. Extremely toxic to fish. Toxic to birds and wildlife. 24-hour reentry. 14-day PHI.
Malathion 5 EC	Malathion See labels. (1.5–4 pt)	See footnote 1, page 6. Group 1B insecticide. 24-hour reentry. 7-day PHI.
Success Naturalyte Insect Control	Spinosad 4–10 oz	Group 5 insecticide. Entrust is the organic formulation. 24-hour reentry. 14-day PHI.
Warrior II	Lambda-cyhalothrin 0.02–0.04 lb ai/A (1.28– 2.56 fl oz)	Group 3A insecticide. Restricted use. Apply no more than 7.68 oz after bloom. 24-hour reentry. 14-day PHI.

Fall webworm

Note: Insecticides labeled for walnut husk fly and *Bacillus thuringiensis* will control this pest. Only spot treatments are necessary. Completely drench the infested branch. Applications made when the larvae are small are most effective.

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.

Footnotes

1. More than one type of formulation usually is available for most insecticides. Lower rates can be used on smaller trees.
2. Bordeaux 4-2-100 means 4 pounds of copper sulfate plus 2 pounds of hydrated lime in 100 gallons of water. In any bordeaux formula, ingredients always are listed in the same order—copper sulfate, hydrated lime, then gallons of water.
3. Early summer nut drop can be a result of codling moth infestation. Inspect nuts for larvae and monitor moths with pheromone traps. *Walnut Production Manual* (University of California Publication 3373) provides information on codling moths as a pest of walnuts.
4. Resistance to copper products has been seen widely in California and may be a problem in the Pacific Northwest. However, copper-resistant bacteria do not seem to cause as much disease as ones that are copper sensitive. Addition of mancozeb (such as Dithane or Manzate) will boost the copper ion concentration and may result in improved disease control. Bacteria, however, will become resistant to the higher copper concentrations.
5. Monitor yellow sticky cards (2 times per week or more) for walnut husk fly captures placed high (upper half) in the canopy by late May/early June. Attraction to sticky cards can be enhanced with ammonium carbonate tubes (superchargers). Use captures of adult flies to time insecticide applications. All listed insecticides for walnut husk flies can be enhanced by tank mixing commercial fruit fly baits, or use GF-120, a bait/insecticide formulation. Coverage is less important when using insecticide with baits. Captured female flies can be squeezed to determine if eggs are present, indicating impending egg laying and crop damage. Egg laying begins 1 to 2 weeks after adult emergence. Orchard sanitation practices such as flailing or removing dropped preharvest and postharvest nuts from the orchard floor can greatly reduce number of overwintering flies.
6. Sprayers used for AFrame Plus, Quadris Top, Quilt Xcel, or Willowood Azoxy should **not be used on apples** such as Gala, Cox's Orange Pippin, and McIntosh. Even a small amount of drift can severely impact these apple trees.

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Table 1. Quick Reference Guide for Herbicides Labeled for Use in Fruit and Nut Crops

- Shaded boxes indicate the herbicide is labeled for use in that crop.
- Nonbearing (NB) indicates the herbicide is labeled only for crops that will not be harvested for 1 year (365-day preharvest interval).
- Herbicides in **bold, italic** type are recommended for new plantings.
- For more complete information, please refer to the *PNW Weed Management Handbook*: <http://pnwhandbooks.org/weed/>.

Ingredient common name (herbicide mode of action)	Product name example	Nuts			Pome fruits		Stone fruits						Rates
		Chestnut	Hazelnut	Walnut	Apple	Pear	Apricot	Cherry	Nectarine	Peach	Plum	Prune	
Applications that are soil active (herbicides in italics and bold are recommended for new plantings)													
diuron (7)	Karmex												1.6–3.2 lb ai/A (2 to 4 lb/A Karmex 80DF)
dichlobenil (20)	Casoron												4–6 lb ai/A (100–150 lb/A Casoron). Apply in cold, wet weather.
<i>isoxaben</i> (21)	<i>Trellis, Gallery</i>				NB	NB	NB	NB	NB	NB	NB	NB	0.5–1 lb ai/A (0.66–1.33 lb/A product)
indaziflam (29)	Alion												0.046–0.085 lb ai/A (3.5–6.5 oz/A product) depending on soil texture
<i>napropamide</i> (3)	<i>Devrinol</i>												4 lb ai/A (8 lb/A)
norflurazon (12)	Solicam												1.95–3.98 lb ai/A (2.5–5 lb/A Solicam)
<i>oryzalin</i> (3)	<i>Surflan</i>												2–6 lb ai/A (2–6 qt/A Surflan)
<i>pendimethalin</i> (3)	<i>Prowl</i>												Prowl H ₂ O: 1.9–6 lb ai/A (2–6.3 qt/A) depending on desired length of weed control and crop
<i>pronamide</i> (3)	<i>Kerb</i>												1–4 lb ai/A (2–8 lb/A). Rate depends on species present and soil texture.
simazine (5)	Princep												See product labels for rates. Princep Caliber 90 is a Special Local Needs label (OR-080038) for sweet cherries only.
sulfentrazone (14)	Zeus XC												0.25–0.375 lb ai/A (8–12 oz/A) depending on soil classification; established 3 years
terbacil (5)	Sinbar						NB	NB				NB	0.4–0.8 lb ai/A (0.5–1 lb/A), newly established; 2–4 lb/A Sinbar, bearing, depending on soil type
<i>trifluralin</i> (3)	<i>Treflan 4L/EC</i>		NB										0.5–1 lb ai/A (1–2 pt/A Treflan 4L)
trifluralin (3) + isoxaben (21) + oxyfluorfen (14)	Showcase	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	2.5–5 lb ai/A (100–200 lb/A Showcase)
Applications that are soil and foliar active													
flazasfuron (2)	Mission												0.033–0.045 lb ai/A (2.14–2.85 oz/A)
flumioxazin (14)	Chateau SW/WDG												0.188–0.38 lb ai/A (6–12 oz/A Chateau WDG). Slight differences in rates and uses in SW and WDG labels.

Table continues on next page

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CONTNUED—Applications that are soil and foliar active												
oxyflurofen (14)	Goal											1.25–2 lb ai/A (5–8 pt/A Goal 2XL)
oxyfluorfen (14) + penoxsulam (2)	Pindar GT											1.47 lb ai/A oxyfluorfen + 0.015 lbs ai/A penoxsulam 1.5–3 pints/A
rimsulfuron (2)	Matrix											0.063 lb ai/A (4 oz/A Matrix FNV per year)
saffluenacil (14)	Treevix											0.045 lb ai/A (1 oz/A Treevix)
Postemergence contact and translocated herbicides												
2,4-D (4)	Saber											Green sucker control in hazelnuts: 0.7–0.95 lb ai/A (1.5–2 pints/A Saber)
acetic acid	WeedPharm											
carfentrazone (14)	Aim											Green sucker control in hazelnuts: 0.031 lb ai/A (2 fl oz/A Aim EC)
clethodim (1)	Select Max		NB	NB	NB	NB	NB	NB	NB		NB	NB
0.06–0.125 lb ai/A (6–8 fl oz/A Select Max)												
clopyralid (4)	Stinger											Apples: 0.094–0.25 lb ae/A (0.25–0.66 pt/A Stinger) Others: 0.12–0.25 lbs ae/A (0.33–0.66 pt/A Stinger)
diquat (22)	Reglone		NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
0.375–0.5 lbs ai/A (1.5–2 pt/A)												
fluazifop (1)	Fusilade DX		NB	NB	NB	NB						
0.25–0.375 lb ai/A (16–24 oz/A Fusilade DX). Refer to specific grassy weeds listed on label.												
glufosinate (10)	Rely 280											0.88–1.5 lb ai/A (1.5–2.5 qt/A Rely 280); sucker control 1.75 qt/A
glyphosate (9)	Roundup											General weed control and grass suppression in row middles. Read label carefully for crops listed and geographic location.
halosulfuron (2)	Sandea											Apples: 0.035–0.094 lb ai/A (0.75–2 oz/A) Nut crops: 0.031–0.063 lb ai/A (¾–1½ oz/A)
paraquat (22)	Gramoxone Inteon											Green sucker control in hazelnuts: 0.625–1 lb cation/A (2.5–4 pt/A Gramoxone Inteon; 1.7–2.7 pt/A Firestorm)
pyraflufen (14)	Venue											0.001–0.006 lb ai/A (0.7–4 fl oz product/A)
sethoxydim (1)	Poast										NB	NB
Grass suppression in row middles: 0.28–0.47 lb ai/A (1.5–2.5 pt/A product)												

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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/>)
- 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>)

Using Pesticides Safely

Always Read the Label

The single most important approach to pesticide safety is to read the pesticide label before each use and then follow the directions. If still in doubt after reading the label, contact a person qualified to help evaluate the hazard of the chemical and its use. Qualified people include extension specialists, county educators, pesticide product representatives, and retailers.

Pesticides are toxic and should be handled with care—but can be used safely if you follow recommended precautions. Follow all label requirements, and strongly consider any recommendations for additional personal protective clothing and equipment. In addition to reading and following the label, other major factors in the safe and effective use of pesticides are the pesticide applicator's qualifications, common sense, and positive attitude. Always take all safety precautions when using pesticides.

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.

In case of accidents involving pesticides, see your doctor at once. It will help your doctor to know exactly which pesticide is involved. The label on the container gives this information. Take to the physician the pesticide label or information from the label, such as the product name, registration number of the U.S. Environmental Protection Agency (EPA), common name and percentage of active ingredient, and first aid instructions. If the label cannot be removed, take along the pesticide container (if not contaminated), but do not take it into the hospital or doctor's office.

Pesticide Safety Checklist

- Use pesticides only when necessary and as part of an Integrated Pest Management (IPM) program.
- Always read the label and follow the instructions.
- Do not allow children to play around sprayers or mixing, storage, and disposal areas.
- Wear appropriate protective clothing and equipment.
- Never eat, drink, or smoke while handling pesticides.
- Avoid drift into non-target areas and pesticide runoff into streams, rivers, lakes, irrigation ponds and canals.
- Avoid spilling materials on skin or clothing.
- Have access to clean water, soap, and first aid supplies.
- Keep pesticides in a dry and locked storage area away from food and feed.
- Triple rinse or pressure rinse empty containers and dispose or recycle in accordance with state and local regulations.
- Stay out of recently sprayed areas until the spray has dried, and observe the restricted entry intervals (REI) specified on the pesticide label.
- Follow the pre-harvest interval (PHI) on the pesticide label before harvesting crops or gardens and before allowing livestock to graze fields.

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