



Pear Programs

Major Diseases

Botrytis-Gray Mold

Gray mold, caused by *Botrytis*, is the second most important apple fruit disease and can be the most important disease affecting pear as shown in recent statewide and regional surveys in the Pacific Northwest. Flowers of both crops are susceptible to *Botrytis* infections which persist throughout the growing season until harvest. *Botrytis* infections remain dormant until storage where the fungus causes Gray Mold with symptoms becoming visible after a few months in storage. Afterward, the fungus can spread to healthy fruit. Temperatures between 64F and 78F are optimal for infections. Because infections occur exclusively in the orchard, it is important to start management as early as possible. Delayed management will fail to control infections that started weeks or months before harvest. The fungus is ubiquitous and overwinters on mummified fruit left on trees and fallen leaves. Good sanitation practices will reduce inoculum loads but because of the explosive nature of this disease, fungicide applications are necessary to achieve good control. At bloom time and during spring, fungicides from FRAC groups 7, 9 and 11, used to control apple powdery mildew or scab, will be effective against *Botrytis* if resistance is absent. Fungicides from FRAC 3 have a limited efficacy against *Botrytis* infections. As fruit mature, they become more susceptible to *Botrytis*. Late season management is especially important for cultivars picked after mid-September in WA when wet, disease conducive weather is more likely. Preharvest applications and ROTATIONS of fungicides from the FRAC groups 1, 7, 11 and 19 control *Botrytis*. Tank-mixture of single-site fungicide with Ziram or captan will increase efficacy and delay the selection for resistant populations. IMPORTANT: *Botrytis cinerea* is the most risky fungus for fungicide resistance development as the fungus can develop resistance to multiple fungicides simultaneously. Remember this aspect when spraying for other diseases such as powdery mildew, as the same fungicides sprayed early in the season can select for resistant *Botrytis* populations which will persist throughout the season and to the storage rooms resulting in limited efficacy of eventual postharvest treatment.

Bull's eye rot

Bull's eye rot is a major disease of apple and pear. The disease can be caused by four different fungal species from the genus *Neofabraea*. The main species causing Bull's eye rot of apple in eastern Washington is *N. perennans*, whereas *N. malicorticis* has been reported to be predominant in western Washington. It infects fruit and causes cankers on trees where it overwinters until conditions become favorable in the following spring when it causes new infections. Fruit are infected exclusively in orchards but Bull's eye rot symptoms are only seen after several months in cold storage. Therefore, preharvest management is key to reducing decay rates in the packinghouse. Prune cankered branches to reduce the inoculum load and use fungicide applications prior to harvest to control. Ziram applied within two weeks before harvest is recommended for control of Bull's eye rot in the Pacific Northwest. Topsin-M is ONLY recommended under wet conditions and for cultivars, such as Golden Delicious, Pinata, Fuji and Granny Smith, more susceptible to Bull's eye rot. Tank-mixtures of Ziram with other single-site fungicides are recommended to increase efficacy and reduced risks of fungicide resistance development. Frequent sprays may increase risk of resistance development to FRAC 1 fungicides used after harvest.

Fire blight

There is a risk of fire blight infection any time there are flowers on the tree, the weather is warm, and wetting occurs. **Early bloom.** Apply biologicals (Blossom Protect) during early bloom (2 applications). Reapply biological if lime sulfur was applied (lime sulfur is antimicrobial and reduces biological populations). **Full bloom to petal fall.** Watch the model. Apply materials 12-24 hours BEFORE moisture events. Sprays every 2 days may be necessary to cover opening flowers during extended high or extreme risk periods. Product used must contact the interior of the flowers in sufficient water and approved wetting agent to completely wet the interior. Applications of less than 100 gal/A can be effective on small trees if flower interiors are well covered, but do not drop the ppm below 200 (oxytetracycline). Application by ground equipment on each row is highly recommended. Application of antibiotics by aircraft are not effective. **Organic.** Prebloom: Fixed copper sanitation if fire blight was in the orchard last year. Apples Easy to Thin: Blossom Protect/ Buffer Protect early, lime sulfur (+ oil), second Blossom Protect/ Buffer Protect. Followed depending on the model and cultivar russet risk with soluble copper (Previsto 3 qt, Cueva 4 qt, or Cueva 3 qt + Serenade Opti, or Instill). Petal fall + 1-2 weeks Serenade Opti (most fruit safe) or 2% lime sulfur (red apples), essential oils (Cinnerate, Thyme Guard), peracetic acids (Oxidate 5.0, Jet-Ag). Apples Hard to Thin/Long Bloom Period: Lime sulfur (+ oil), then Blossom Protect + Buffer Protect, then a Lime sulfur (+ oil), then a second Blossom Protect + Buffer Protect. Depending on the model and cultivar russet risk soluble copper (Previsto 3 qt, Cueva 4 qt, Cueva 3 qt + Serenade Opti, or Instill). Petal fall + 1-2 weeks Serenade Opti or 2% lime sulfur (red apples), essential oils (Cinnerate, Thyme Guard), peracetic acids (Oxidate 5.0, Jet-Ag). Apples Hard to thin varieties/ short bloom period: Lime sulfur (+ oil) 2-3 applications. Depending on the model and cultivar russet risk follow with soluble copper (Previsto 3 qt, Cueva 4 qt, Cueva 3 qt + Serenade Opti, or Instill). Petal fall + 1-2 weeks: Serenade Opti (most fruit safe) or 2% lime sulfur (red apples), essential oils (Cinnerate, Thyme Guard), peracetic acids (Oxidate 5.0, Jet Ag). Pears Easy to Mark Varieties: 2 applications of Blossom Protect + Buffer Protect during early bloom to petal fall (70-80% bloom if single

treatment). Follow with Serenade Opti at petal fall to reduce russet risk from Blossom Protect yeast. Pears Marking Tolerant Varieties: 2 applications of Blossom Protect + Buffer Protect during early bloom to petal fall (70-80% bloom if single treatment). Follow with soluble copper (Cueva 4 qrt, Previsto 3 qrt, or Cueva 3 qrt + Serenade Opti) if the model indicates risk (warm/wet).

Pear mildew

Apple and pear powdery mildew is caused by the same fungal species *Podosphaera leucotricha* which overwinters in dormant apple buds, whereas its survival in pear remains unknown. When infected buds break in spring, the fungus produces spores that are rain and wind-spread to infect freshly emerged leaves which are highly susceptible powdery mildew. Germination and infections are optimal at temperatures between 60F and 78F. Wetness plays a marginal role. The fungus then continues its multi-cycle infections through spring and early summer until the productions of new leaves and shoots cease. The fungus is slowed down by the rising temperature (above 82F) as summer progresses. Infection resumes in fall where the pathogen overwinters as ascospores (sexual form) or infected buds. Under high disease pressure and mild summer conditions, the fungus can cause russetting on fruits and therefore reduce quality. While no cultivar is immune, cultivars like Granny Smith, Honeycrisp, Idared and Crimson Crisp are highly susceptible, whereas Golden Delicious is susceptible and Fuji, Gala and Red Delicious are the least susceptible. Mildew management should start before bud break and at green tip stage (to reduce spread of new inoculum) with sulfur-based products and continue every 10 to 14 days until the production of new shoots cease. Fungicides from FRAC groups 3, 7, 11 and 19 are effective and SHOULD be ROTATED throughout the season. In growing, regions where scab is a problem, spray programs used to control the latter will control powdery mildew as well. In organic orchards, sulfur, potassium bicarbonate, and some biopesticides usually provide a good level of control.

Pear scab

Scab, caused by the fungus *Venturia pyrina* on pear, is a major disease of pear fruit in many growing regions, especially those with high rainfall. Typical scab symptoms include gray-brown to blackish lesions on leaves and fruit. Because of the semi-arid conditions during the growing season in central Washington, scab risk is low. However, some microclimates in Northcentral Washington can be conducive to scab and therefore, management is recommended. In western Washington scab is common. Pear scab can cause problems in northern Washington growing regions and in Hood River, Oregon but it is rarely seen in central and south Washington State.

Storage Rots (Sphaeropsis, Lambertella, Alternaria)

Several other fungal fruit infections initiated in the orchard can cause storage rots. Alternaria rot: A dark-brown to black infection caused by *Alternaria alternata* (and other spp.) is ubiquitous in most orchards. Infections, usually sporadic, may become frequent when sanitation is not observed or when wet conditions occur for an extended period. The fungus infects flowers at bloom, but can also infect fruit through the calyx end or wounds. Floral infections can result in moldy-core disease

later in storage.

Sphaeropsis rot: A sporadic emerging disease caused by the fungus *Sphaeropsis pyriputrescens* infects fruits in the orchard and develops stem and calyx end rots in storage. The fungus overwinters on cankers and twigs. Prune diseased branches to help reduce inoculum. Pruning symptomatic crab apples is particularly important. Although this disease can be sporadic, it is still quarantined in many export countries and its identification in entry ports will result in fruit lot rejection.

Yellow-Lambertella rot: This disease was recently reported in the Pacific Northwest and, therefore, is considered as quarantine pathogen. Infections are caused by the fungus *L. corni-maritima*, which has been isolated from mummies of other fruit crops in the past but its disease cycle in apple is still unknown. The disease develops yellow mycelium that cover the fruit, but symptoms are only observed after several months of storage. Recent studies have shown that fungicides from FRAC group 1 are not effective against *Lambertella*, whereas fungicides from FRAC groups 7 and 11 have only moderate efficacy. Until further research has shown which other preharvest fungicides are effective, it is recommended to apply a fungicide from FRAC group 9 or 12 postharvest, as these were found to be the most effective. The fungus requires a wound on the cuticle to cause an infection, therefore, reducing damages and punctures at harvest will reduce infection risks. The possibility of infections occurring through the calyx- or stem-ends is still unknown.

Major Insects

Codling moth

Codling moth is the key pest of pome fruits in the Pacific Northwest. In general, apples are more susceptible than pears, and fruits with softer flesh are more susceptible to attack. The increasing frequency of a third generation, two have been the norm historically, means that growers must be vigilant throughout the growing season, and be aware of phenology (See WSU Decision Aid system at <https://decisionaid.systems>). Codling moth has a long history of becoming resistant to insecticides, thus rotation of materials with different modes of action (MOA) is highly recommended. Avoid using the same MOA against consecutive generations to minimize this danger. The MOA for each material is listed in the tables. Pheromone mating disruption was registered in 1990, and has since been widely adopted in Washington. Use of mating disruption is now considered the foundation of an IPM program. Supplementing mating disruption with insecticides may be necessary depending on pressure, and using pheromone traps for monitoring populations will prevent unnecessary applications. Detailed recommendations on pheromone placement and timing of sprays is available. Additional Details about Codling moth

Leafrollers (Pandemis, Obliquebanded)

Pre-bloom applications of pesticides can be effective and will also conserve natural enemies for leafroller and biological control agents of other pests, such as aphids. If treatments for leafrollers were applied at pink and/or bloom, sampling to determine the density of surviving leafrollers should be completed prior to deciding to apply additional controls at this timing. Most products listed act primarily as stomach poisons versus direct contact to residues, therefore, complete coverage is very

important to achieve maximal control. Repeating an application of any product should be based on the leafroller population surviving previous treatments. Use the leafroller models on the WSU Decision Aid System (<https://decisionaid.systems>) for the optimum timing. Additional Details about Leafrollers (Pandemis, Obliquebanded)

Pear psylla

Pear psylla, *Cacopsylla pyricola*, is a major pest of pears in the Pacific Northwest. While it is specific to pear, a portion of the population overwinters in alternative host plants such as apple and non-cultivated trees and shrubs. Pear psylla becomes active in orchards in late winter and early spring. Egg lay begins on wood while trees are dormant or at bud swell and generally peaks between popcorn and bloom on green tissues. The first generation of nymphs emerge between popcorn and petalfall. Pear psylla undergo 3–4 generations in a season, with the 3rd and 4th usually occurring during or after harvest depending on the cultivar and season. While many programs rely heavily on repeated broad-spectrum sprays from dormant through harvest, softer programs use particle films (Surround CF or WP and diatomaceous earth) for adult repellency and selective insecticides (Esteem, Dimilin, Centaur, Neem products, Cinnerate, Rosemary oils) are encouraged for conservation of natural enemies. Therefore, when possible, materials are noted as broad-spectrum when expected to disrupt some combination of predators *Deraeocoris brevis*, *Campylomma verbasci*, earwigs, anthrocorids and the parasitoid wasp *Trechnites insidiosus*. Selective materials are expected to conserve these natural enemies, which are highly effective at controlling psylla later in the season. Additional Details about Pear psylla

Pear rust mite

Pear rust mite, *Epirimerus pyri*, is a common pest of pears. Although similar in appearance and injury, it is not the same as Apple rust mite, *Aculus schlechtendali*. Pear rust mite is a very small mite that requires magnification to see. Pear rust mite becomes active as soon as buds develop. Because natural enemies will not prevent injury, control measures must be taken prior to bloom (lime sulfur before green tissue, micronized sulfur after). If left uncontrolled rust mites will injure the developing fruit, causing scarring around the calyx. Rust mites will continue to feed through the season on both the fruit and leaves, causing a light russetting over their surfaces. If rust mites reemerge in the summer, they are readily controlled by most conventional miticides. Organic products such as cinnamon and rosemary oils also have shown efficacy against this pest. Postharvest sulfur sprays lower populations for the following season. Additional Details about Pear rust mite

San Jose scale

San Jose scale can be a minor pest if adequately controlled, or escalate into a major problem if not. It primarily infests the trunk and limbs, but scale crawlers will settle on the fruit. Damage to this season's crop may become serious, but ultimately the infestation of wood may cause death of limbs or the entire tree. Oil plus an organophosphate in the delayed dormant spray provide control; if the organophosphate is omitted (oil only), monitor the trees carefully and add one of the listed materials if scale become numerous. Additional Details about San Jose scale

Spray Schedule

Dormant

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|--|--------------------------|-------------|-------------|---------------|------|--|
| Pear psylla | diatomaceous earth Celite 610 | 40-70 lb | none listed | none listed | particle film | 3-4 | Adding a spreader sticker will improve residue stability. Organic |
| | petroleum oil- dormant petroleum oil- dormant | 1-1.5 % v/v | 12 h | none listed | | 4 | Organic |
| | lime sulfur/calcium polysulfide + petroleum oil- dormant Rex Lime Sulfur + petroleum oil- dormant | See Label 1-1.5 % v/v | 48 h | 0 d | un | 4 | Organic |
| | kaolin Surround CF Agricultural Crop Protectant | 50-100 lb | 4 h | 0 d | particle film | 4 | This formulation is designed for mixing with cold water, preferred for pre-bloom sprays. Organic |
| | kaolin clay + petroleum oil- dormant Surround WP + petroleum oil- dormant | 25-50 lb 1-1.5 % v/v | 4 h | 0 d | particle film | 4 | Apply two to three applications as necessary to cover new growth between dormant/delayed dormant and first bloom. Organic |
| | lambda-cyhalothrin Warrior II | 2.56 fl oz | 24 h | 21 d | 3 | 1-2 | Can be mixed with Piperonyl butoxide (PBO) to increase efficacy. Pyrethroid (MOA 3A) resistance is present in many areas and may severely reduce efficacy. |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Delayed dormant

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------------|--|-------------------|------|-------------|-----|------|--|
| European red mite | petroleum oil- dormant petroleum oil- dormant | 1.5 % v/v | 12 h | none listed | | 2 | Use no more than 5 gals. oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals. per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |
| Grape mealybug | diazinon + petroleum oil- dormant Diazinon 50W + petroleum oil- dormant | 4 lb 1.5 % v/v | 4 d | 21 d | 1B | 3 | Use no more than 5 gals oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Diazinon is labeled for a maximum of one dormant and one in-season application in pear. |
| | petroleum oil- dormant petroleum oil- dormant | 1.5 % v/v | 12 h | none listed | | 4 | Use no more than 5 gals oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals. per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|--|--|-------------|-------------|---------------|------|---|
| Pear psylla | tolfenpyrad Bexar | 27 fl oz | 12 h | 14 d | 21A | 4 | Do not make more than two applications of Bexar in a season. Mortality of adults, eggs, and nymphs. |
| | diatomaceous earth Celite 610 | 40-70 lb | none listed | none listed | particle film | 3-4 | Adding a spreader sticker will improve residue stability. Organic |
| | cinnamon oil + petroleum oil, summer Cinnerate + petroleum oil, summer | 48-64 fl oz 1-2 gal | none listed | 0 d | un | 1-3 | Marking has been seen only when applied after June turn down. 200 GPA sprays can increase likelihood of marking. Contact only, requires repeat sprays. Organic |
| | diflubenzuron + petroleum oil- dormant Dimilin 2L + petroleum oil- dormant | 40-48 fl oz 1-1.5 % v/v | 12 h | 14 d | 15 | 2-3 | Insect growth regulators Dimilin and Esteem are most effective when applied prior to significant egg deposition. See Label. Use no more than 5 gals. oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. |
| | petroleum oil- dormant petroleum oil- dormant | 1-1.5 % v/v | 12 h | none listed | | 4 | Use no more than 5 gals. oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |
| | lime sulfur/calcium polysulfide + petroleum oil- dormant lime sulfur/calcium polysulfide + petroleum oil- dormant | See label gal See label See Label | 48 h | 0 d | un | 4 | Use no more than 5 gal oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gal per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |
| | kaolin Surround CF Agricultural Crop Protectant | 50-100 lb | 4 h | 0 d | particle film | 4 | This formulation is designed for mixing with cold water, preferred for pre-bloom sprays. Organic |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---------------------------------------|---|--------------------------|------|-------------|---------------|------|---|
| | kaolin clay + petroleum oil- dormant Surround WP + petroleum oil- dormant | 50-100 lb 1-1.5 % v/v | 4 h | 0 d | particle film | 4 | Apply two to three applications between dormant/delayed dormant and first bloom. Coverage of green tissue is important; apply every 2-3 weeks or as needed to cover new tree growth. Use no more than 5 gals. oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |
| | lambda-cyhalothrin Warrior II | 2.56 fl oz | 24 h | 21 d | 3 | 1-2 | Can be mixed with Piperonyl butoxide (PBO) to increase efficacy. Pyrethroid (MOA 3A) resistance is present in many areas and may severely reduce efficacy. |
| Pear rust mite, pearleaf blister mite | micronized sulfur 80% Acoidal Micronized Wettable Sulfur WDG | 10-20 lb | 24 h | none listed | M2 | NR | Sulfur or limesulfur with oil prebloom and postharvest are important tools for rust mite in organic systems or when broadspectrum materials are not used. Apply with oil. Apply only at dormant and delayed dormant on sensitive varieties (eg. Anjou). Significant reduction in rust mite and russetting in one trial (Riedel and Shearer 1987 43A) but not in another (Riedel and Shearer 1987 41A). Organic |
| | petroleum oil- dormant petroleum oil- dormant | 1-1.5 % v/v | 12 h | none listed | | NR | Use no more than 5 gals. oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |
| | lime sulfur/calcium polysulfide lime sulfur/calcium polysulfide | See Label | 48 h | 0 d | un | 3-4 | Organic |
| San Jose scale | pyriproxyfen Esteem 35WP | 4-5 oz | 12 h | 45 d | 7C | 1 | |
| | petroleum oil- dormant petroleum oil- dormant | 1-1.5 % v/v | 12 h | none listed | | 3 | Use no more than 5 gals oil per acre in concentrate sprays. In areas where pears are susceptible to oil injury, reduce dosage so that no more than 5 gals per acre are applied during the prebloom period. If scale is a problem, use a dilute spray. Use handgun for hard-to-cover problem areas. Organic |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Tight cluster

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--|---|---------------|------|-------------|-----|------|---|
| European red mite | petroleum oil- dormant petroleum oil- dormant | 1 % v/v | 12 h | none listed | | 2 | Organic |
| Grape mealybug | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | NR | PHI depends on rate used. Use a diluted spray for full coverage. |
| | acetamiprid Assail 70WP | 2.3-3.4 oz | 12 h | 7 d | 4A | 1 | |
| | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | 3-4 | |
| | diazinon Diazinon 50W | 4 lb | 4 d | 21 d | 1B | 3 | Diazinon is labeled for a maximum of one dormant and one in-season application in pear. |
| | phosmet Imidan 70W | 5.33 lb | 7 d | 7 d | 1B | 2 | Broad-spectrum on pear psylla natural enemies. |
| Lygus bugs, stink bugs, green fruitworm | flonicamid Beleaf 50 SG Insecticide | 2-2.8 oz | 12 h | 21 d | 29 | NR | Needs further study. 50% control of adults and 65% control of young nymphs in one WA study in alfalfa [Walsh 2018]. |
| | diazinon Diazinon 50W | 4 lb | 4 d | 21 d | 1B | NR | Do not mix diazinon with oil. Diazinon is labeled for a maximum of one dormant and one in-season application in pear. |
| | sulfoxaflor Transform | 1.5-2.75 oz | 24 h | 7 d | 4C | NR | Needs further testing. 68% control of adults and 71% control of young nymphs in one WA study in alfalfa [Walsh 2018]. |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|----------------|--|------------------------|-------------|-------------|---------------|------|---|
| Pear psylla | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | 3 | Broad-spectrum on pear psylla natural enemies. PHI depends on rate used. See label. |
| | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | 2 | Resistance to abamectin has been documented in certain areas, so efficacy may vary. Broad-spectrum on mite and pear psylla predators. Do not apply from onset of flowering until after petal fall is complete. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 3 | Adult, egg and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | azadirachtin Aza-Direct Botanical Insecticide | See label | 4 h | 0 d | un | 2-3 | Selective; compatible with pear psylla natural enemies. Short residues; 7-10 day reapplication intervals may be necessary for control. Severe phytotoxicity may occur if applied to pear cultivars with Comice background. Organic |
| | tolfenpyrad Bexar | 27 fl oz | 12 h | 14 d | 21A | 4 | Do not make more than two applications of Bexar in a season. Mortality of adults, eggs, and nymphs. |
| | diatomaceous earth Celite 610 | 40-70 lb | none listed | none listed | particle film | 3-4 | Adding a spreader sticker will improve residue stability. Organic |
| | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | 2-3 | |
| | cinnamon oil + petroleum oil, summer Cinnerate + petroleum oil, summer | 48-64 fl oz 1-2 gal | none listed | 0 d | un | 1-3 | Marking has been seen only when applied after June turn down. 200 GPA sprays can increase likelihood of marking. Contact only, requires repeat sprays. Organic |
| | spinetoram Delegate WG | 7 oz | 4 h | 7 d | 5 | 3-4 | Psylla adult and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | pyriproxyfen Esteem 35WP | 5 oz | 12 h | 45 d | 7C | 2-4 | Pyriproxyfen needs to be timed with adults just before they lay eggs. It will not kill adults or prevent egg lay, but will cause adults to lay infertile eggs. Selective; compatible with pear psylla natural enemies. |
| | kaolin Surround CF Agricultural Crop Protectant | 50-100 lb | 4 h | 0 d | particle film | 4 | This formulation is designed for mixing with cold water, preferred for pre-bloom sprays. Organic |
| | kaolin clay Surround WP | 50 lb | 4 h | 0 d | particle film | 3-4 | Kaolin clay residues used after June may be difficult to remove from fruit when packing, especially red or soft skin varieties. Organic |
| San Jose scale | pyriproxyfen Esteem 35WP | 4-5 oz | 12 h | 45 d | 7C | 1 | |

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Popcorn

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|--|--------------------------|------|------|------|------|--|
| Pear mildew | benzovindiflupyr Aprovia | 7 fl oz | 12 h | 30 d | 7 | 3 | Do not follow Aprovia with fungicides from FRAC group 7 such as Fontelis, Luna and Pristine to reduce fungicide resistance development. |
| | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | NR | Fontelis and Aprovia are from the same chemical group (7). Use one of them ONLY at the same growth stage. |
| | pydiflumetofen Miravis | 3.4 fl oz | 12 h | 30 d | 7 | 3 | Rotate with other FRAC groups other than FRAC 7. |
| | triflumizole Procure 480SC | 8-16 fl oz | 12 h | 14 d | 3 | 4 | Procure is a FRAC 3 fungicide and should not be rotated or used with other FRAC 3 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 3 fungicides per season. Do not make more than two sequential applications of FRAC 3 fungicides labeled for use on pome fruits. |
| | lime sulfur/calcium polysulfide Rex Lime Sulfur | 2 gal | 48 h | 0 d | un | NR | Do NOT use lime sulfur or micronized sulfur on Anjou. Organic |
| Pear scab | mancozeb mancozeb | 6 lb | 24 h | 77 d | M3 | NR | |
| | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | NR | Fontelis and Aprovia are from the same chemical group (7). Use one of them ONLY at the same growth stage. |
| | pydiflumetofen + benzovindiflupyr Miravis + Aprovia | 3.4 fl oz 5.5-7 fl oz | 12 h | 30 d | 7, 7 | NR | Aprovia, Fontelis, and Miravis are from the same chemical group (7). Use ONLY one of them at the same growth stage. |
| | triflumizole Procure 480SC | 8-16 fl oz | 12 h | 14 d | 3 | NR | Rate varies when used in eradicant (postinfective) schedules. See label. |
| | lime sulfur/calcium polysulfide lime sulfur/calcium polysulfide | See Label | 48 h | 0 d | un | NR | Do NOT use lime sulfur or micronized sulfur on Anjou. Organic |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|------------------------|---|------------------------|-------------|------|---------------|------|--|
| Leafrollers (Pandemis) | Bacillus thuringiensis subsp. kurstaki DiPel DF | See label | 4 h | 0 d | 11A | 3 | While too early for Obliquebanded leafrollers, this is the appropriate timing for Pandemis. Bts are stomach poisons, so complete coverage is very important for control. Two or three applications are usually required. Apply when forecasts predict a warm weather pattern for 3 or more days. Organic |
| Pear psylla | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 3 | Adult, egg and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | azadirachtin Aza-Direct Botanical Insecticide | See label | 4 h | 0 d | un | 2-3 | Selective; compatible with pear psylla natural enemies. Short residues; 7-10 day reapplication intervals may be necessary for control. Severe phytotoxicity may occur if applied to pear cultivars with Comice background. Organic |
| | tolfenpyrad Bexar | 27 fl oz | 12 h | 14 d | 21A | 4 | Do not make more than two applications of Bexar in a season. Mortality of adults, eggs, and nymphs. |
| | cinnamon oil + petroleum oil, summer Cinnerate + petroleum oil, summer | 48-64 fl oz 1-2 gal | none listed | 0 d | un | 1-3 | Marking has been seen only when applied after June turn down. 200 GPA sprays can increase likelihood of marking. Contact only, requires repeat sprays. Organic |
| | spinetoram Delegate WG | 7 oz | 4 h | 7 d | 5 | 3-4 | Psylla adult and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | diflubenzuron Dimilin 2L | 40-48 fl oz | 12 h | 14 d | 15 | 2-3 | |
| | pyriproxyfen Esteem 35WP | 5 oz | 12 h | 45 d | 7C | 2-4 | Pyriproxyfen needs to be timed with adults just before they lay eggs. It will not kill adults or prevent egg lay, but will cause adults to lay infertile eggs. Selective; compatible with pear psylla natural enemies. |
| | novaluron Rimon 0.83EC | 32 fl oz | 12 h | 14 d | 15 | 3 | Do not apply after initiation of pear turndown. Broad-spectrum on pear psylla natural enemies. |
| | kaolin clay Surround WP | 50 lb | 4 h | 0 d | particle film | 3-4 | Kaolin clay residues used after June may be difficult to remove from fruit when packing, especially red or soft skin varieties. Organic |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Pink

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|------------------------------------|---------------|-----|-----|-----|------|---|
| Pear mildew | Ipflufenquin Axios 20 SC | 2.25-3 fl oz | 4 h | 7 | 52 | 4 | Make first application at green tip stage. Do not apply more than once every 7 days. Do not make more than 3 applications per year. Do not make more than 2 sequential applications. Do not apply within 7 days of harvest; (PHI = 7 days). |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

First bloom

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|---|---------------|------|-------------|-----|------|--|
| Fire blight | Aureobasidium pullulans strains DSM 14940 & 14941 Blossom Protect | 1.25 lb | 4 h | none listed | NC | 4 | Apply with Buffer Protect. Two or more applications best. Yeasts need 1-2 days before an infection to colonize the flower before bacteria invade to be effective. Russet potential on sensitive varieties in humid conditions. Organic |
| | oxytetracycline FireLine 17WP | 16 oz | 12 h | 60 d | 41 | 4 | Best activity within 24 h before wetness event. Check spray tank pH, 5.5-6.0 optimal. Best activity at 200 ppm: 1.0 lb/100 gal. |
| | kasugamycin Kasumin 2L | 64 fl oz | 12 h | 90 d | 24 | 4 | Best control when applied less than 24 h before wetness event. Potentially some control up to 12 h after wetting. |
| | calcium oxytetracycline Mycoshield | 16 oz | 12 h | 60 d | 41 | 4 | Best activity within 24 h before wetness event. Check spray tank pH, 5 optimal. 200 ppm: 1.0 lb/100 gal. |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------|--|---------------|-------------|-------------|-----|------|--|
| Pear mildew | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | 3 | Fontelis is a FRAC 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 7 fungicides per season. Do not make sequential applications of FRAC 7 fungicides labeled for use on pome fruits. |
| | pydiflumetofen Miravis | 3.4 fl oz | 12 h | 30 d | 7 | 3 | Rotate with other FRAC groups other than FRAC 7. |
| | triflumizole Procure 480SC | 8-16 fl oz | 12 h | 14 d | 3 | 4 | Procure is a FRAC 3 fungicide and should not be rotated or used with other FRAC 3 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 3 fungicides per season. Do not make more than two sequential applications of FRAC 3 fungicides labeled for use on pome fruits. Apply no sooner than half-inch green. |
| | Notes: The efficacy level will depend on the absence of resistant populations from the orchard. To limit the potential for development of fungicide resistance, do not make more than four applications of FRAC group 11 fungicides per season. Do not make more than two sequential applications of FRAC group 11 fungicides. This limitation is inclusive of all FRAC group 11 fungicides labeled for use on pome fruits. | | | | | | |
| Pear scab | mancozeb mancozeb | 6 lb | 24 h | 77 d | M3 | NR | |
| | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | NR | |
| | triflumizole Procure 480SC | 8-16 fl oz | 12 h | 14 d | 3 | NR | |
| | lime sulfur/calcium polysulfide lime sulfur/calcium polysulfide | See Label | 48 h | 0 d | un | NR | Organic |
| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
| Codling moth | CM pheromone dispensers Isomate-C Plus | See label | none listed | none listed | | NR | Install dispensers before first flight (prior to bloom) using the full label rate in the top 2 feet of the canopy. When using aerosol emitters borders should be treated with hand-applied dispensers. Organic |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|------------------------|---|---------------|-----|-----|-----|------|--|
| Leafrollers (Pandemis) | Bacillus thuringiensis subsp. kurstaki DiPel DF | See label | 4 h | 0 d | 11A | 3 | While this is too early for Obliquebanded leafrollers, this timing is appropriate for Pandemis. Bts are stomach poisons, so complete coverage is very important for control. Two or three applications are usually required. Apply when forecasts predict a warm weather pattern for 3 or more days. Organic |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Bloom

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------------|---|---------------|------|-----|-------|------|--|
| Botrytis-Gray Mold | fluxapyroxad + pyraclostrobin Merivon | 5.5 fl oz | 12 h | 0 d | 7, 11 | 3 | Merivon is a FRAC group 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. Do not make more than three FRAC 7 applications in a season. |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|---|---------------|------|-------------|------|------|--|
| Fire blight | acibenzolar-s-methyl Actigard 50WG | 1-2 fl oz | 12 h | 60 d | P01 | NR | For bloom applications: Apply 1–2 oz/A in a tank mix with a fire blight treatment (generally an antibiotic) that is standard in your area. This is generally 2-3 applications between 20% bloom and petal fall depending on the environmental conditions. Do not apply closer than a 7-day interval. Also used to reduce re-occurrence of blight after cutting out infected strikes. Apply concentrate to a one meter section of the main leader after cutting see http://treefruit.wsu.edu/crop-protection/disease-management/fire-blight/ |
| | Aureobasidium pullulans strains DSM 14940 & 14941 Blossom Protect | 1.25 lb | 4 h | none listed | NC | 4 | Apply with Buffer Protect. Two or more applications best. Yeasts need 1-2 days before an infection to colonize the flower before bacteria invade to be effective. Russet potential on sensitive varieties in humid conditions. Organic |
| | copper octanoate Cueva | 4 qt | 4 h | 0 d | M1 | 3 | Little russet in semi-arid WA trials. Some russet risk in wetter OR. Tank mix compatible with Bacillus-based biopesticides. Soluble copper efficacy 47% to 73% in WSU trials 2013 to 2022 (DuPont et al. 2023). Organic |
| | Bacillus amyloliquefaciens strain D747 Double Nickel LC Biofungicide | 3 lb | 4 h | 0 d | BM02 | 2 | See label and space between rows to select the corresponding rate. Efficacy may vary based on disease pressure. Can be used with copper fungicides to increase control. Relative disease suppression in Washington trials average 30%. Organic |
| | oxytetracycline FireLine 17WP | 16 oz | 12 h | 60 d | 41 | 4 | Best activity within 24 h before wetness event. Check spray tank pH, 5.5-6.0 optimal. Best activity at 200 ppm: 1.0 lb/100 gal. |
| | kasugamycin Kasumin 2L | 64 fl oz | 12 h | 90 d | 24 | 4 | Best control when applied less than 24 h before wetness event. Potentially some control up to 12 h after wetting. |
| | Copper sulfate pentahydrate Mastercop | 40 fl oz | 48 h | 0 d | M1 | 3 | Pay attention to drying times. Soluble copper efficacy 47% to 73% in WSU trials 2013 to 2022 (DuPont et al. 2023). Organic |
| | calcium oxytetracycline Mycoshield | 16 oz | 12 h | 60 d | 41 | 4 | Best activity within 24 h before wetness event. Check spray tank pH, 5 optimal. 200 ppm: 1.0 lb/100 gal. |
| | copper hydroxide Previsto | 3-4 qt | 48 h | none listed | M1 | 3 | Pay attention to drying times and do not combine with acidifying products to reduce fruit finish risks. Organic |
| | Bacillus subtilis strain QST 713 Serenade Opti | 20 oz | 4 h | 0 d | BM02 | 2 | Efficacy may vary based on disease pressure. Median relative disease suppression 50% in WA trials 2017 to 2021, 60% WA and OR 2012-2015. Organic |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Petal fall

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------------|---|---------------|------|------|-------|------|--|
| Botrytis-Gray Mold | copper octanoate Cueva | 8 qt | 4 h | 0 d | M1 | 2 | Organic |
| | fluxapyroxad + pyraclostrobin Merivon | 5.5 fl oz | 12 h | 0 d | 7, 11 | 3 | Merivon is a FRAC group 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. Do not make more than three FRAC 7 applications in a season. |
| | thiophanate-methyl Topsin M WSB | 1 lb | 2 d | 1 d | 1 | 3 | Efficacy level is ensured when resistance is absent from the orchard. Do not apply more than 2.8 lbs. a.i. per acre in a year. Topsin-M is very prone to fungicide resistance development, rotation with other FRAC group is required. Do not make sequential applications of FRAC group 1 fungicides and do not make more than two FRAC 1 fungicides per season. Topsin-M is similar to Mertect, used postharvest, therefore careful use is highly recommended. |
| Bull's eye rot | ziram Ziram 76DF Fungicide | See label | 48 h | 14 d | M3 | 3 | Apply while pear calyx is still upright and then in the first cover spray and in preharvest ideally before rain. Do NOT apply within 14 days of harvest. When applicable, tank-mix with other single-site fungicides to increase efficacy and reduce risk of fungicide resistance development. Do not apply more than 18.4 lbs. a.i of Ziram 76DF or equivalent per season. Aerial application allowed only at preharvest. |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|--|---------------|-------------|-------------|------|------|--|
| Fire blight | acibenzolar-s-methyl Actigard 50WG | 1-2 fl oz | 12 h | 60 d | P01 | NR | For bloom applications: Apply 1–2 oz/A in a tank mix with a fire blight treatment (generally an antibiotic) that is standard in your area. This is generally 2-3 applications between 20% bloom and petal fall depending on the environmental conditions. Do not apply closer than a 7-day interval. Also used to reduce re-occurrence of blight after cutting out infected strikes. Apply concentrate to a one meter section of the main leader after cutting see http://treefruit.wsu.edu/crop-protection/disease-management/fire-blight/ |
| | cinnamon oil Cinnerate | 32 fl oz | none listed | 0 d | un | 2 | Essential oil products provided median relative disease suppression (45-49%) in 3 WA trials with repeat applications. Use as part of an integrated program. Consider drying times to minimize marking risk. Organic |
| | copper octanoate Cueva | 4 qt | 4 h | 0 d | M1 | 3 | Little russet in semi-arid WA trials. Some russet risk in wetter OR. Tank mix compatible with Bacillus-based biopesticides. Soluble copper efficacy 47% to 73% in WSU trials 2013 to 2022 (DuPont et al. 2023). Organic |
| | Bacillus amyloliquefaciens strain D747 Double Nickel LC Biofungicide | 3 lb | 4 h | 0 d | BM02 | 2 | See label and space between rows to select the corresponding rate. Efficacy may vary based on disease pressure. Can be used with copper fungicides to increase control. Relative disease suppression in Washington trials average 30%. Organic |
| | oxytetracycline FireLine 17WP | 16 oz | 12 h | 60 d | 41 | 4 | Best activity within 24 h before wetness event. Check spray tank pH, 5.5-6.0 optimal. Best activity at 200 ppm: 1.0 lb/100 gal. |
| | hydrogen peroxide + peroxyacetic acid Jet-Ag | 128 fl oz | 4 h | none listed | | 2 | Provided moderate relative disease suppression (median 48%-62%) in WA over 3 trials with repeat applications. Use as part of an integrated program. Consider drying times to minimize marking risk. Rate per 100 gal. |
| | kasugamycin Kasumin 2L | 64 fl oz | 12 h | 90 d | 24 | 4 | Best control when applied less than 24 h before wetness event. Potentially some control up to 12 h after wetting. |
| | calcium oxytetracycline Mycoshield | 16 oz | 12 h | 60 d | 41 | 4 | Best activity within 24 h before wetness event. Check spray tank pH, 5 optimal. 200 ppm: 1.0 lb/100 gal. |
| | hydrogen peroxide peroxyacetic acid OxiDate 5.0 | 128 fl oz | See label | 0 d | | 2 | Provided moderate relative disease suppression (median 48%-62%) in WA over 3 trials with repeat applications. Use as part of an integrated program. Consider drying times to minimize marking risk. Organic |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---------|--|---------------|------|-------------|------|------|--|
| | copper hydroxide Previsto | 3-4 qt | 48 h | none listed | M1 | 3 | Pay attention to drying times and do not combine with acidifying products to reduce fruit finish risks. Organic |
| | Bacillus subtilis strain QST 713 Serenade Opti | 20 oz | 4 h | 0 d | BM02 | 2 | Efficacy may vary based on disease pressure. Median relative disease suppression 50% in WA trials 2017 to 2021, 60% WA and OR 2012-2015. Organic |
| | thyme oil Thyme Guard | 2 qt | 4 h | none listed | | 2 | Essential oil products provided moderate relative disease suppression (46-49%) in 4 WA trials with repeat applications. Use as part of an integrated program. Consider drying times to minimize marking risk. Organic |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--|---|---------------|------|------|-------|---|--|
| Pear mildew | benzovindiflupyr Aprovia | 5.5-7 fl oz | 12 h | 30 d | 7 | 3 | Do not follow Aprovia with fungicides from FRAC group 7 such as Fontelis, Luna and Pristine to reduce fungicide resistance development. |
| | Ipflufenquin Axios 20 SC | 2.25-3 fl oz | 4 h | 7 | 52 | 4 | Make first application at green tip stage. Do not apply more than once every 7 days. Do not make more than 3 applications per year. Do not make more than 2 sequential applications. Do not apply within 7 days of harvest; (PHI = 7 days). |
| | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | 3 | Fontelis is a FRAC 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 7 fungicides per season. Do not make sequential applications of FRAC 7 fungicides labeled for use on pome fruits. |
| | potassium bicarbonate Kaligreen | 3 lb | 4 h | 1 d | NC | 2 | Under low disease pressure, Kaligreen will provide adequate control. If disease pressure increases, rotation or combination with other materials is recommended. Organic |
| | fluopyram Luna Privilege | 6.84 fl oz | 12 h | 7 d | 7 | 4 | Luna Privilege is a FRAC group 7 fungicide and should not be rotated or used with fungicides from the same group. Do not apply more than 3 applications of FRAC group 7 fungicides in a season. |
| | fluxapyroxad + pyraclostrobin Merivon | 5.5 fl oz | 12 h | 0 d | 7, 11 | 3 | Merivon is a FRAC group 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. Do not make more than three FRAC 7 applications in a season. |
| | pydiflumetofen Miravis | 3.4 fl oz | 12 h | 30 d | 7 | 3 | Rotate with other FRAC groups other than FRAC 7. |
| | polyoxin D zinc salt OSO 5%SC | 13 fl oz | 4 h | 0 d | 19 | 3 | OSO is FRAC 19 fungicide recommended to rotate with other FRAC groups labeled for pome fruit. Do not apply more than 4.3 oz. a.i./acre/season. Organic |
| | triflumizole Procure 480SC | 16 fl oz | 12 h | 14 d | 3 | 4 | Procure is a FRAC 3 fungicide and should not be rotated or used with other FRAC 3 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 3 fungicides per season. Do not make more than two sequential applications of FRAC 3 fungicides labeled for use on pome fruits. |
| Reynoutria sachalinensis Regalia | 4 qt | 4 h | 0 d | P5 | 2 | Do not use prior to petal fall. Under low disease pressure, it may help control some summer diseases like Alternaria and Bull's eye rot. Organic | |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--|---|--------------------------|------|------|------|------|---|
| | triflumazole Trionic 4SC | 16 fl oz | 12 h | 14 d | 3 | 4 | Trionic is a FRAC 3 fungicide and should not be rotated or used with other FRAC 3 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 3 fungicides per season. Do not make more than two sequential applications of FRAC 3 fungicides labeled for use on pome fruits. |
| Pear scab | mancozeb mancozeb | 6 lb | 24 h | 77 d | M3 | NR | |
| | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | NR | Fontelis and Aprovia are from the same chemical group (7). Use ONLY one of them for the same growth stage. Do not make more than 4 application per season for fungicides from the same group. Additional restriction may apply, check specific labels. |
| | pydiflumetofen + benzovindiflupyr Miravis + Aprovia | 3.4 fl oz 5.5-7 fl oz | 12 h | 30 d | 7, 7 | NR | Aprovia, Fontelis, and Miravis are from the same chemical group (7). Use ONLY one of them for the same growth stage. Do not make more than 4 application per season for fungicides from the same group. Additional restriction may apply, check specific labels. |
| | triflumazole Procure 480SC | 8-16 fl oz | 12 h | 14 d | 3 | NR | |
| | lime sulfur/calcium polysulfide Rex Lime Sulfur | See label | 48 h | 0 d | un | NR | Organic |
| Storage Rots (Sphaeropsis, Lambertella, Alternaria) | penthiopyrad Fontelis | 20 fl oz | 12 h | 28 d | 7 | 3 | Fontelis has an acceptable efficacy against Alternaria fungus and Nectria that may infect fruit preharvest. Fontelis is a FRAC 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 7 fungicides per season. Do not make sequential applications of FRAC 7 fungicides labeled for use on pome fruits. |
| | polyoxin D zinc salt OSO 5%SC | 13 fl oz | 4 h | 0 d | 19 | 3 | OSO will help control Alternaria and Nectria infections preharvest. OSO is FRAC 19 fungicide recommended to rotate with other FRAC groups labeled for pome fruit. Do not apply more than 4.3 oz. a.i./acre/season. Organic |
| | polyoxin D zinc salt Ph-D Fungicide | 6.2 oz | 4 h | 0 d | 19 | 3 | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|----------------|---|---------------|-------------|-------------|-----|------|---|
| Codling moth | CM pheromone dispensers Isomate-C Plus | See label | none listed | none listed | | NR | Install dispensers before first flight (prior to bloom) using the full label rate in the top 2 feet of the canopy. When using aerosol emitters borders should be treated with hand-applied dispensers. Organic |
| | petroleum oil, summer petroleum oil, summer | See Label | 4 h | 0 d | | NR | Organic |
| Grape mealybug | thiamethoxam Actara | 4.5-5.5 oz | 12 h | 14 d/35 d | 4A | NR | PHI depends on rate used. See label. |
| | imidacloprid Admire Pro | 5.6-7 fl oz | 12 h | 7 d | 4A | NR | Rate and PHI indicated is for foliar application. |
| | acetamiprid Assail 70WP | 2.3-3.4 oz | 12 h | 7 d | 4A | 1 | |
| | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | NR | |
| | diazinon Diazinon 50W | 4 lb | 4 d | 21 d | 1B | 3 | Diazinon is labeled for a maximum of one dormant and one in-season application in pear. |
| | phosmet Imidan 70W | 5.33 lb | 7 d | 7 d | 1B | 2 | Broad-spectrum on pear psylla natural enemies. |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---|---|---------------|---|------|-----|------|--|
| Leafrollers (Pandemis, Obliquebanded) | chlorantraniliprole Altacor eVo Insect Control | 2.2 oz | 4 h | 5 d | 28 | 4 | For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | spinetoram Delegate WG | 4.5-7 oz | 4 h | 7 d | 5 | 4 | Delegate is effective against leafroller larvae. It has a residual activity of 14 days. Delegate is in the same chemical class (MOA=5) as Success (spinosad). For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | Bacillus thuringiensis subsp. kurstaki DiPel DF | See label | 4 h | 0 d | 11A | 3 | Bt products should be timed to coincide with periods of warm weather when high temperatures are expected to reach 65 degrees for three consecutive days. Multiple applications are typically required to control high populations. Organic |
| | pyriproxyfen Esteem 35WP | 4-5 oz | 12 h | 45 d | 7C | 4 | Esteem should be applied when last stage larvae are present but before pupation has begun. For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | methoxyfenozide Intrepid 2F | 16 fl oz | 4 h | 14 d | 18 | 3 | Some leafroller populations have developed resistance to Intrepid and its use could result in reduced levels of control. For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | emamectin benzoate Proclaim | 3.2-4.8 oz | 12 h 48 h for some activities-see label | 14 d | 6 | 4 | For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | spinosad Success | 6-10 fl oz | 4 h | 7 d | 5 | 3-4 | Some leafroller populations have developed resistance to spinosad and its use could result in reduced levels of control. For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| McDaniel spider mite, twospotted spider mite, European red mite | cyflumetofen Nealta | 13.7 fl oz | 12 h | 7 d | 25 | 3-4 | Low impacts on natural enemies. |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|----------------------------------|---|------------------------|-------------|-------------|---------------|--|---|
| Pear psylla | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | 3 | Broad-spectrum on pear psylla natural enemies. PHI depends on rate used. See label. |
| | imidacloprid Admire Pro | 5.6-7 fl oz | 12 h | 7 d | 4A | 2-3 | Rate and PHI indicated is for foliar application. Do not use until bees have been removed. |
| | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | 2 | Resistance to abamectin has been documented in certain areas, so efficacy may vary. Broad-spectrum on mite and pear psylla predators. Do not apply from onset of flowering until after petal fall is complete. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 3 | Adult, egg and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | azadirachtin Aza-Direct Botanical Insecticide | See label | 4 h | 0 d | un | 2-3 | Selective; compatible with pear psylla natural enemies. Short residues; 7-10 day reapplication intervals may be necessary for control. Severe phytotoxicity may occur if applied to pear cultivars with Comice background. Organic |
| | tolfenpyrad Bexar | 27 fl oz | 12 h | 14 d | 21A | 4 | Do not make more than two applications of Bexar in a season. Mortality of adults, eggs, and nymphs. |
| | diatomaceous earth Celite 610 | 40-70 lb | none listed | none listed | particle film | 3-4 | Adding a spreader sticker will improve residue stability. Organic |
| | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | 2-3 | |
| | cinnamon oil + petroleum oil, summer Cinnerate + petroleum oil, summer | 48-64 fl oz 1-2 gal | none listed | 0 d | un | 1-3 | Marking has been seen only when applied after June turn down. 200 GPA sprays can increase likelihood of marking. Contact only, requires repeat sprays. Organic |
| | spinetoram Delegate WG | 7 oz | 4 h | 7 d | 5 | 3-4 | Psylla adult and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | pyriproxyfen Esteem 35WP | 5 oz | 12 h | 45 d | 7C | 2-4 | Pyriproxyfen needs to be timed with adults just before they lay eggs. It will not kill adults or prevent egg lay, but will cause adults to lay infertile eggs. Selective; compatible with pear psylla natural enemies. |
| | pyridaben Nexter SC | 11-17 oz | 12 h | 10 d | 21A | 3-4 | |
| novaluron Rimon 0.83EC | 32 fl oz | 12 h | 14 d | 15 | 3 | Do not apply after initiation of pear turndown. Broad-spectrum on pear psylla natural enemies. | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-----------------------|--|---------------|------|------|---------------|------|---|
| | kaolin clay Surround WP | 50 lb | 4 h | 0 d | particle film | 3-4 | Kaolin clay residues used after June may be difficult to remove from fruit when packing, especially red or soft skin varieties. Organic |
| | spirotetramat Ultror | 10-14 fl oz | 24 h | 7 d | 23 | 2-4 | Time Ultror applications after petal fall, when the canopy is well developed, but leaves have not hardened off. A second application 14 days after the first may be helpful. This material is systemic. It kills feeding nymphs and must be applied before eggs hatch. Selective on pear psylla; compatible with natural enemies. |
| Pear rust mite | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | 4 | Broad-spectrum on mite and pear psylla predators. Do not apply from onset of flowering until after petal fall is complete. |
| | spirodiclofen Envidor 2SC | 16-18 fl oz | 12 h | 7 d | 23 | 4 | |
| | fenpyroximate FujiMite SC | 2 pt | 12 h | 14 d | 21A | NR | |
| | cyflumetofen Nealta | 13.7 fl oz | 12 h | 7 d | 25 | 3-4 | Effective against mites and has low impacts on natural enemies. |
| | pyridaben Nexter SC | 11-17 oz | 12 h | 10 d | 21A | 3 | |
| | fenbutatin oxide Vendex 50WP | 1-1.5 lb | 48 h | 14 d | 12B | 2-4 | |
| Pearleaf blister mite | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | NR | Broad-spectrum on mite and pear psylla predators. Do not apply from onset of flowering until after petal fall is complete. |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

14-32 days after full bloom

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------|--|---------------|------|------|-----|------|--|
| Codling moth | imidacloprid Admire Pro | 7 fl oz | 12 h | 7 d | 4A | NR | |
| | chlorantraniliprole Altacor eVo Insect Control | 3-4.5 oz | 4 h | 5 d | 28 | 4 | Selective; compatible with pear psylla natural enemies. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | NR | Broad-spectrum on pear psylla natural enemies. |
| | spinetoram Delegate WG | 6-7 oz | 4 h | 7 d | 5 | 4 | Broad-spectrum on pear psylla natural enemies. |
| | diflubenzuron Dimilin 2L | 16 fl oz | 12 h | 14 d | 15 | 4 | Selective, compatible with pear psylla natural enemies. In trials percent control compared to the untreated check (based on fruit infected or with stings) has ranged from 76-90 percent (Dunley et al. 2002), 87 percent for Dimilin+oil (Van Steenwyk et al. 2004), 89 percent (Van Steenwyk and Nomoto 2002), 98 percent (Van Steenwyk et al. 2003). |
| | spinosad Entrust SC | 10 fl oz | 4 h | 7 d | 5 | 3 | Entrust is a spinosad formulation registered for organic apple production. It is effective against codling moth larvae hatching from the egg. It has a residual activity of 7 to 10 days. When Entrust is incorporated into an organic pest control program using pheromones, summer oil, and codling moth virus, good control of this key pest is possible. Best results occur when applications are timed for egg hatch, which may occur during bloom. Organic |
| | cyantraniliprole Exirel Insect Control | 10-17 fl oz | 12 h | 3 d | 28 | 4 | |
| | phosmet Imidan 70W | 5.33 lb | 7 d | 7 d | 1B | 3 | Broad-spectrum on pear psylla natural enemies. |
| | methoxyfenozide Intrepid 2F | 16 fl oz | 4 h | 14 d | 18 | 3 | Selective; compatible with pear psylla natural enemies. Should be applied before egg hatch. In efficacy studies it has provided 89 percent control (Van Steenwyk and Nomoto 2002) and 95 percent control (Van Steenwyk and Weiss 2015). |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-------------|--|---------------|------|------|---------------|------|--|
| | <p>Notes: WSU recommends a delayed first cover management program: Apply the first oil at 375 DD, then 150 degree days later put on the first cover at 525 DD. Then 15 days later (depending on residue length) put on the second cover. This approach leaves only a small percentage of egg hatch at the end of each generation uncovered. An oil-only program requires re-application intervals of 200 DD under low pest pressure and 150 DD under high pest pressure. CM granulovirus is effective when applied at 525 DD and repeated every 5-7 days until about 950 DD (4-5 applications). In any program, mating disruption increases control considerably. In high pressure situations, use CM granulovirus with oil for better control. For summer generations add 1000 degree days for second and third cover.</p> | | | | | | |
| Pear psylla | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 3 | Adult, egg and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | diflubenzuron Dimilin 2L | 48 fl oz | 12 h | 14 d | 15 | 2-3 | |
| | pyriproxyfen Esteem 35WP | 5 oz | 12 h | 45 d | 7C | 2-4 | Pyriproxyfen needs to be timed with adults just before they lay eggs. It will not kill adults or prevent egg lay, but will cause adults to lay infertile eggs. Selective; compatible with pear psylla natural enemies. |
| | kaolin clay Surround WP | 50 lb | 4 h | 0 d | particle film | 3-4 | Kaolin clay residues used after June may be difficult to remove from fruit when packing, especially red or soft skin varieties. Organic |
| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
| Pear mildew | pydiflumetofen Miravis | 3.4 fl oz | 12 h | 30 d | 7 | 3 | Rotate with other FRAC groups other than FRAC 7. |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Late spring and summer

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------|---|---------------|------|------|-----|------|--|
| Codling moth | chlorantraniliprole Altacor eVo Insect Control | 3-4.5 oz | 4 h | 5 d | 28 | 4 | Selective; compatible with pear psylla natural enemies. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | NR | Broad-spectrum on pear psylla natural enemies. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | NR | |
| | CM granulosis virus strain M (CpGV-M) Cyd-X HP Insecticidal Virus | 0.5-3 fl oz | 4 h | 0 d | 31 | 3 | The codling moth granulosis virus is a highly specific control that should always be used as the virus strains are highly specialized and should always be used as a component of a multi-tactic pest management program. The residual activity, shortened by UV light, lasts at most 7 days. The effect of the virus is most often seen in a suppression of the pest's densities over time, as it kills the caterpillar after it has entered the apple. Apply with oil and rotate virus strains/isolates by codling moth generation to slow resistance evolution. Resistance to CpGV-M (Cyd-X HP/Madex HP) in WA has been documented at one site (Fan et al. 2022) and to (Cyd-X HP/Madex HP and Virosoft CP4) at a second location (Nielsen unpublished). Screening to document the potential for widespread resistance is ongoing. Organic |
| | spinetoram Delegate WG | 6-7 oz | 4 h | 7 d | 5 | 4 | Broad-spectrum on pear psylla natural enemies. |
| | diflubenzuron Dimilin 2L | 16 fl oz | 12 h | 14 d | 15 | 4 | Selective, compatible with pear psylla natural enemies. In trials percent control compared to the untreated check (based on fruit infected or with stings) has ranged from 76-90 percent (Dunley et al. 2002), 87 percent for Dimilin+oil (Van Steenwyk et al. 2004), 89 percent (Van Steenwyk and Nomoto 2002), 98 percent (Van Steenwyk et al. 2003). |
| | spinosad Entrust SC | 10 fl oz | 4 h | 7 d | 5 | 3 | Entrust is a spinosad formulation registered for organic apple production. It is effective against codling moth larvae hatching from the egg. It has a residual activity of 7 to 10 days. When Entrust is incorporated into an organic pest control program using pheromones, summer oil, and codling moth virus, good control of this key pest is possible. Best results occur when applications are timed for egg hatch, which may occur during bloom. Organic |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--|---|---------------|------|------|-----|------|---|
| | pyriproxyfen Esteem 35WP | 5 oz | 12 h | 45 d | 7C | 3 | |
| | cyantraniliprole Exirel Insect Control | 10-17 fl oz | 12 h | 3 d | 28 | 4 | |
| | phosmet Imidan 70W | 5.33 lb | 7 d | 7 d | 1B | 3 | Broad-spectrum on pear psylla natural enemies. |
| | methoxyfenozide Intrepid 2F | 16 fl oz | 4 h | 14 d | 18 | 3 | Selective; compatible with pear psylla natural enemies. Should be applied before egg hatch. In efficacy studies it has provided 89 percent control (Van Steenwyk and Nomoto 2002) and 95 percent control (Van Steenwyk and Weiss 2015). |
| | CM granulosis virus isolate V22 (CpGV-M) Madex HP Insecticidal Virus | 0.5-3 fl oz | 4h | 0 d | 31 | 3 | See note Cyd-X HP. |
| | CM granulovirus isolate GV-0017 Madex XLV | 0.5-3 fl oz | 4h | 0 d | 31 | 3 | See note Cyd-X HP. Organic |
| | petroleum oil, summer petroleum oil, summer | See Label | 4 h | 0 d | | NR | Organic |
| | CM granulosis virus strain S (CpGV-S) CM granulosis virus strain S (CpGV-S) | 0.5-3.2 fl oz | 4h | 0 d | 31 | 3 | See note Cyd-X HP. Organic |
| <p>Notes: WSU recommends a delayed first cover management program: Apply the first oil at 375 DD, then 150 degree days later put on the first cover at 525 DD. Then 15 days later (depending on residue length) put on the second cover. This approach leaves only a small percentage of egg hatch at the end of each generation uncovered. An oil-only program requires re-application intervals of 200 DD under low pest pressure and 150 DD under high pest pressure. CM granulosis virus is effective when applied at 525 DD and repeated every 5-7 days until about 950 DD (4-5 applications). In any program, mating disruption increases control considerably. In high pressure situations, use CM granulosis virus with oil for better control. For summer generations add 1000 degree days for second and third cover.</p> | | | | | | | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|----------------------------------|-----------------------------------|---------------|------|-----------|-----|------|--|
| Grape mealybug | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | NR | PHI depends on rate used. See label. |
| | imidacloprid Admire Pro | 5.6-7 fl oz | 12 h | 7 d | 4A | NR | Rate and PHI indicated is for foliar application. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 1 | |
| | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | NR | |
| | phosmet Imidan 70W | 5.33 lb | 7 d | 7 d | 1B | 2 | Broad-spectrum on pear psylla natural enemies. |
| Grasshoppers and Mormon crickets | carbaryl carbaryl | 2 pt | 12 h | 3 d | 1A | NR | If used in apple/pear interplant blocks, carbaryl may disrupt biological mite control, depending on history of use. Do not apply carbaryl prior to 30 days after full bloom. |
| Green apple aphid | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | NR | PHI depends on rate used. See label. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 4 | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---------------------------------------|---|---------------|---|------|-----|------|--|
| Leafrollers (Pandemis, Obliquebanded) | chlorantraniliprole Altacor eVo Insect Control | 2.2 oz | 4 h | 5 d | 28 | 4 | For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | spinetoram Delegate WG | 4.5-7 oz | 4 h | 7 d | 5 | 4 | For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | Bacillus thuringiensis subsp. kurstaki DiPel DF | See label | 4 h | 0 d | 11A | 3 | Two or three applications are usually required. Apply when forecasts predict a warm weather pattern for 3 or more days. For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. Organic |
| | cyantraniliprole Exirel Insect Control | 10-17 fl oz | 12 h | 3 d | 28 | 4 | For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | methoxyfenozide Intrepid 2F | 16 fl oz | 4 h | 14 d | 18 | 3 | Some leafroller populations have developed resistance to methoxyfenozide and its use could result in reduced levels of control. For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | emamectin benzoate Proclaim | 3.2-4.8 oz | 12 h 48 h for some activities-see label | 14 d | 6 | 4 | For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |
| | spinosad Success | 6-10 fl oz | 4 h | 7 d | 5 | 3-4 | Some leafroller populations have developed resistance to spinosad and its use could result in reduced levels of control. For effective leafroller control, this product must be consumed by larvae. Therefore good spray coverage of the foliage is critical to achieving good control. |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---|--|---------------|------|------|-----|------|--|
| McDaniel spider mite, twospotted spider mite, European red mite | bifenazate Acramite 50WS | 0.75-1 lb | 12 h | 7 d | un | 2-4 | |
| | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | 1-3 | Broad-spectrum on mite and pear psylla predators. |
| | clofentezine Apollo 4SC | 4-8 fl oz | 12 h | 21 d | 10A | 2-4 | Clofentezine (Apollo) and hexythiazox (Savey) are ovicides. When initial mite populations are high, use in combination with an adulticide. |
| | spirodiclofen Envidor 2SC | 16-18 fl oz | 12 h | 7 d | 23 | 3-4 | |
| | fenpyroximate FujiMite SC | 1-2 pt | 12 h | 14 d | 21A | 3-4 | Broad-spectrum on predator mites. |
| | acequinocyl Kanemite 15 SC | 21-31 fl oz | 12 h | 14 d | 20B | NR | |
| | cyflumetofen Nealta | 13.7 fl oz | 12 h | 7 d | 25 | 3-4 | Low impacts on natural enemies. |
| | pyridaben Nexter SC | 11-17 oz | 12 h | 10 d | 21A | 2-4 | |
| | hexythiazox Savey 50DF | 4-6 oz | 12 h | 28 d | 10A | 2-4 | Hexythiazox (Savey) and clofentezine (Apollo) are ovicides. When initial mite populations are high, use in combination with an adulticide. |
| | fenbutatin oxide Vendex 50WP | 1.5-2 lb | 48 h | 14 d | 12B | 2-4 | Resistance to fenbutatin oxide exists in many areas. Somewhat selective to spider mites; medium effects on predator mites. |
| | etoxazole Zeal Miticide1 72WSP | 3 oz | 12 h | 14 d | 10B | 1-3 | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-----------------------------------|---|------------------------|-------------|---------------|---------------|--|---|
| Pear psylla | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | 3 | Broad-spectrum on pear psylla natural enemies. PHI depends on rate used. See label. |
| | imidacloprid Admire Pro | 5.6-7 fl oz | 12 h | 7 d | 4A | NR | Rate and PHI indicated is for foliar application. |
| | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | 2 | Resistance to abamectin has been documented in certain areas, so efficacy may vary. Broad-spectrum on mite and pear psylla predators. Do not apply from onset of flowering until after petal fall is complete. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | 3 | Adult, egg and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | azadirachtin Aza-Direct Botanical Insecticide | See label | 4 h | 0 d | un | 2-3 | Selective; compatible with pear psylla natural enemies. Short residues; 7-10 day reapplication intervals may be necessary for control. Severe phytotoxicity may occur if applied to pear cultivars with Comice background. Organic |
| | tolfenpyrad Bexar | 27 fl oz | 12 h | 14 d | 21A | 3-4 | This is a contact insecticide so coverage will greatly effect efficacy. Check with packing house acceptability of applications later than June. |
| | diatomaceous earth Celite 610 | 40-70 lb | none listed | none listed | particle film | 3-4 | Adding a spreader sticker will improve residue stability. Organic |
| | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | 2-3 | |
| | cinnamon oil + petroleum oil, summer Cinnerate + petroleum oil, summer | 48-64 fl oz 1-2 gal | none listed | 0 d | un | 1-3 | Marking has been seen only when applied after June turn down. 200 GPA sprays can increase likelihood of marking. Contact only, requires repeat sprays. Organic |
| | spinetoram Delegate WG | 7 oz | 4 h | 7 d | 5 | 3-4 | Psylla adult and nymph mortality. Broad-spectrum on pear psylla natural enemies. |
| | diflubenzuron Dimilin 2L | 48 fl oz | 12 h | 14 d | 15 | 2-3 | |
| | fenpyroximate FujiMite SC | 1-2 pt | 12 h | 14 d | 21A | 1-2 | |
| | pyridaben Nexter SC | 11-17 oz | 12 h | 10 d | 21A | 3-4 | |
| kaolin clay Surround WP | 50 lb | 4 h | 0 d | particle film | 3-4 | Kaolin clay residues used after June may be difficult to remove from fruit when packing, especially red or soft skin varieties. Organic | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--|--|---------------|------|-----------|-----|------|--|
| | spirotetramat Ultor | 10-14 fl oz | 24 h | 7 d | 23 | 2-4 | Time Ultor applications after petal fall, when the canopy is well developed, but leaves have not hardened off. A second application 14 days after the first may be helpful. This material is systemic. It kills feeding nymphs and must be applied before eggs hatch. Selective on pear psylla; compatible with natural enemies. |
| Pear rust mite | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | 4 | Broad-spectrum on mite and pear psylla predators. |
| | spirodiclofen Envidor 2SC | 16-18 fl oz | 12 h | 7 d | 23 | 4 | |
| | fenpyroximate FujiMite SC | 2 pt | 12 h | 14 d | 21A | NR | |
| | cyflumetofen Nealta | 13.7 fl oz | 12 h | 7 d | 25 | 3-4 | Effective against mites and has low impacts on natural enemies. |
| | pyridaben Nexter SC | 11-17 oz | 12 h | 10 d | 21A | 3 | |
| | fenbutatin oxide Vendex 50WP | 1-1.5 lb | 48 h | 14 d | 12B | 2-4 | |
| Pear slug | thiamethoxam Actara | 5.5 oz | 12 h | 14 d/35 d | 4A | NR | PHI depends on rate used. See label. |
| | acetamiprid Assail 70WP | 3.4 oz | 12 h | 7 d | 4A | NR | |
| | spinetoram Delegate WG | 6 oz | 4 h | 7 d | 5 | NR | |
| | fenpyroximate FujiMite SC | 2 pt | 12 h | 14 d | 21A | NR | |
| | spinosad Success | 4 fl oz | 4 h | 7 d | 5 | NR | |
| | spinosad Success | 4 fl oz | 4 h | 7 d | 5 | NR | Some leafroller populations have developed resistance to spinosad products and repeated use of these products during the growing season could result in reduced levels of control. |
| Notes: Pear Sawfly larvae (pearslug) are fairly susceptible to most pesticides; those listed are the ones tested, but other materials and lower rates may also work. See the cherry section for additional materials. | | | | | | | |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|-----------------------|---|---------------|------|------|-------|------|--|
| Pearleaf blister mite | abamectin Agri-Mek SC | 4.25 fl oz | 12 h | 28 d | 6 | NR | Broad-spectrum on mite and pear psylla predators. Do not apply from onset of flowering until after petal fall is complete. |
| | carbaryl carbaryl | 0.5-1.5 qt | 12 h | 3 d | 1A | NR | If used in apple/pear interplant blocks, carbaryl may disrupt biological mite control, depending on history of use. Do not apply carbaryl prior to 30 days after full bloom. |
| San Jose scale | buprofezin Centaur WDG | 34.5 oz | 12 h | 14 d | 16 | 2-3 | |
| | diazinon Diazinon 50W | 4 lb | 4 d | 21 d | 1B | 3-4 | Diazinon is labeled for a maximum of one dormant and one in-season application in pear. |
| | pyriproxyfen Esteem 35WP | 5 oz | 12 h | 45 d | 7C | 2-3 | Be aware that Esteem has a 45 day PHI. |
| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
| Pear mildew | potassium bicarbonate Kaligreen | 3 lb | 4 h | 1 d | NC | 2 | Under low disease pressure, Kaligreen will provide adequate control. If disease pressure increases, rotation or combination with other materials is recommended. Organic |
| | fluopyram Luna Privilege | 6.84 fl oz | 12 h | 7 d | 7 | 4 | Luna Privilege is a FRAC group 7 fungicide and should not be rotated or used with fungicides from the same group. Do not apply more than 3 applications of FRAC group 7 fungicides in a season. |
| | fluxapyroxad + pyraclostrobin Merivon | 5.5 fl oz | 12 h | 0 d | 7, 11 | 3 | Merivon is a FRAC group 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. Do not make more than three FRAC 7 applications in a season. |
| | polyoxin D zinc salt OSO 5%SC | 13 fl oz | 4 h | 0 d | 19 | 3 | OSO is FRAC 19 fungicide recommended to rotate with other FRAC groups labeled for pome fruit. Do not apply more than 4.3 oz. a.i./acre/season. Organic |
| | Reynoutria sachalinensis Regalia | 4 qt | 4 h | 0 d | P5 | 2 | Do not use prior to petal fall. Under low disease pressure, it may help control some summer diseases like Alternaria and Bull's eye rot. Organic |
| | triflumazole Trionic 4SC | 16 fl oz | 12 h | 14 d | 3 | 4 | Trionic is a FRAC 3 fungicide and should not be rotated or used with other FRAC 3 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 3 fungicides per season. Do not make more than two sequential applications of FRAC 3 fungicides labeled for use on pome fruits. |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---|---|-------------------------------|------|------|------|------|---|
| Pear scab | penthiopyrad Fontelis | 14-20 fl oz | 12 h | 28 d | 7 | NR | Fontelis and Aprovia are from the same chemical group (7). Use only one of them for the same growth stage. |
| | pydiflumetofen + benzovindiflupyr Miravis + Aprovia | 3.4 fl oz 5.5 to 7.0 fl oz | 12 h | 30 d | 7, 7 | 2 | Do not follow FRAC group 7 fungicides with other group 7s, such as Aprovia, Fontelis, Luna, Miravis, and Pristine to reduce fungicide resistance development. |
| | Notes: To limit the potential for development of fungicide resistance, do not make more than four applications of strobilurin fungicides per season. Do not make more than two sequential applications of strobilurin fungicides. This limitation is inclusive of all strobilurin fungicides labeled for use on pome fruits. | | | | | | |
| Storage Rots (Sphaeropsis, Lambertella, Alternaria) | penthiopyrad Fontelis | 20 fl oz | 12 h | 28 d | 7 | 3 | Fontelis has an acceptable efficacy against Alternaria fungus and Nectria that may infect fruit preharvest. Fontelis is a FRAC 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. To limit the potential for development of fungicide resistance, do not make more than 3 applications of FRAC 7 fungicides per season. Do not make sequential applications of FRAC 7 fungicides labeled for use on pome fruits. |
| | polyoxin D zinc salt OSO 5%SC | 13 fl oz | 4 h | 0 d | 19 | 3 | OSO will help control Alternaria and Nectria infections preharvest. OSO is FRAC 19 fungicide recommended to rotate with other FRAC groups labeled for pome fruit. Do not apply more than 4.3 oz. a.i./acre/season. Organic |
| | Reynoutria sachalinensis Regalia | 4 qt | 4 h | 0 d | P5 | 2 | Do not use prior to petal fall. Under low disease pressure, it may help control some summer diseases like Alternaria and Bull's eye rot. Organic |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

Preharvest

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------------|---|---------------|------|------|-----|------|--|
| Botrytis-Gray Mold | thiophanate-methyl Topsin M WSB | 1 lb | 2 d | 1 d | 1 | 3 | Efficacy level is ensured when resistance is absent from the orchard. Do not apply more than 2.8 lbs. a.i. per acre in a year. Topsin-M is very prone to fungicide resistance development, rotation with other FRAC group is required. Do not make sequential applications of FRAC group 1 fungicides and do not make more than two FRAC 1 fungicides per season. Topsin-M is similar to Mertect, used postharvest, therefore careful use is highly recommended. |
| Bull's eye rot | thiophanate-methyl Topsin M WSB | 1 lb | 2 d | 1 d | 1 | 4 | Efficacy level is ensured when resistance is absent from the orchard. Do not apply more than 2.8 lbs. a.i. per acre in a year. Topsin-M is very prone to fungicide resistance development, rotation with other FRAC group is required. Do not make sequential applications of FRAC group 1 fungicides and do not make more than two FRAC 1 fungicides per season. Topsin-M is similar to Mertect, used postharvest, therefore careful use is highly recommended. |
| | ziram Ziram Granuflo 76WDG | 6 lb | 48 h | 14 d | M3 | NR | Because of visible residues, do not use ziram on Asian pears. |

| Disease | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---|---|---------------|------|------|------------|------|--|
| Storage Rots (Sphaeropsis, Lambertella, Alternaria) | Aureobasidium pullulans strain DSM 14940/14941 Botector | 6-10 oz | 4 h | 0 d | Biological | 3 | Organic |
| | fluxapyroxad + pyraclostrobin Merivon | 5.5 fl oz | 12 h | 0 d | 7, 11 | 3 | Merivon is a FRAC group 7 fungicide and should not be rotated or used with other FRAC 7 fungicides. Do not make more than three FRAC 7 applications in a season. |
| | polyoxin D zinc salt Ph-D Fungicide | 6.2 oz | 4 h | 0 d | 19 | 3 | |
| | thiophanate-methyl Topsin M WSB | 1 lb | 2 d | 1 d | 1 | 3 | Efficacy level is ensured when resistance is absent from the orchard. Do not apply more than 2.8 lbs. a.i. per acre in a year. Topsin-M is very prone to fungicide resistance development, rotation with other FRAC group is required. Do not make sequential applications of FRAC group 1 fungicides and do not make more than two FRAC 1 fungicides per season. Topsin-M is similar to Mertect, used postharvest, therefore careful use is highly recommended. |
| | ziram Ziram 76DF Fungicide | 6 lb | 48 h | 14 d | M3 | 2 | Apply while pear calyx is still upright and then in the first cover spray and in preharvest ideally before rain. Do NOT apply within 14 days of harvest. When applicable, tank-mix with other single-site fungicides to increase efficacy and reduce risk of fungicide resistance development. Do not apply more than 18.4 lbs. a.i of Ziram 76DF or equivalent per season. Aerial application allowed only at preharvest. |

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|--------------|---|---------------|-----|-----|-----|------|---|
| Codling moth | CM granulosis virus strain M (CpGV-M) Cyd-X HP Insecticidal Virus | 0.5-3 fl oz | 4 h | 0 d | 31 | 3 | The codling moth granulosis virus is a highly specific control that should always be used as the virus strains are highly specialized and should always be used as a component of a multi-tactic pest management program. The residual activity, shortened by UV light, lasts at most 7 days. The effect of the virus is most often seen in a suppression of the pest's densities over time, as it kills the caterpillar after it has entered the apple. Apply with oil and rotate virus strains/isolates by codling moth generation to slow resistance evolution. Resistance to CpGV-M (Cyd-X HP/Madex HP) in WA has been documented at one site (Fan et al. 2022) and to (Cyd-X HP/Madex HP and Virosoft CP4) at a second location (Nielsen unpublished). Screening to document the potential for widespread resistance is ongoing. Organic |
| | CM granulovirus isolate GV-0017 Madex XLV | 0.5-3 fl oz | 4h | 0 d | 31 | 3 | See note Cyd-X HP. Organic |
| | petroleum oil, summer petroleum oil, summer | See Label | 4 h | 0 d | | NR | Organic |
| | CM granulovirus strain S (CpGV-S) CM granulovirus strain S (CpGV-S) | 0.5-3.2 fl oz | 4h | 0 d | 31 | 3 | See note Cyd-X HP. Organic |
| Pear psylla | azadirachtin Aza-Direct Botanical Insecticide | See label | 4 h | 0 d | un | 2-3 | Selective; compatible with pear psylla natural enemies. Short residues; 7-10 day reapplication intervals may be necessary for control. Severe phytotoxicity may occur if applied to pear cultivars with Comice background. Organic |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

After Harvest

| Insect | Chemical | Rate per Acre | REI | PHI | MOA | Eff. | Notes |
|---|---|---------------|------|-------------|-----|------|--|
| Pear psylla | lime sulfur/calcium polysulfide lime sulfur/calcium polysulfide | See label gal | 48 h | 0 d | un | 4 | Follow label directions regarding apple interplants and orchard borders. See page Fruit and Leaf injury for more information. Organic |
| Pear rust mite, pearleaf blister mite | micronized sulfur 80% Acoidal Micronized Wettable Sulfur WDG | 10-20 lb | 24 h | none listed | M2 | NR | Sulfur or limesulfur with oil prebloom and postharvest are important tools for rust mite in organic systems or when broadspectrum materials are not used. Apply with oil. Apply only at dormant and delayed dormant on sensitive varieties (eg. Anjou). Significant reduction in rust mite and russeting in one trial (Riedel and Shearer 1987 43A) but not in another (Riedel and Shearer 1987 41A). Organic |
| | lime sulfur/calcium polysulfide Rex Lime Sulfur | See label | 48 h | 0 d | un | NR | Follow label directions regarding apple interplants and orchard borders. See page Fruit and Leaf injury for more information. Organic |
| Notes: If used in apple/pear interplant blocks, carbaryl may disrupt biological mite control, depending on history of use. | | | | | | | |

Rate and PHI indicated is for foliar application. Efficacy numbers denote the relative efficacy of a pesticide against a given pest on a 1 to 4 scale with 1 being low and 4 high efficacy. This information is based primarily on research conducted with WSU researchers in Washington.

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