



Sweet Cherry Programs

For mrls visit <https://nwhort.org/export-manual/comparisonmrls/>

Major Diseases

Bacterial canker or gummosis

Bacterial canker or gummosis (*Pseudomonas syringae*) is a serious disease of cherry in the Pacific Northwest. It is particularly damaging to young trees and can result in replanting issues if un-managed. Spread of the pathogen is favored by cool, moist weather. Optimum timing for control of bacterial gummosis is in late winter before trees break of dormancy and spring frost, and wet weather occur. In the fall, apply most materials before autumn rains or after October 1.

Brown rot

Brown rot is a serious disease of stone fruit when wet conditions occur in the orchard. The disease is caused by the fungus *Monilinia fructicola* although other species (i.e. *M. laxa* and *M. fructigena*) have been reported in other regions. There are both floral and fruit phases of the disease. Brown rot is explosive and highly favored by rain events during bloom (blossom infection) and immediately prior to harvest (fruit infection). Many fungicide materials are effective on both brown rot and powdery mildew. Use the products list on the bloom table for brown rot, as they are effective, and mildew sprays are not recommended at this stage of tree growth. Neither iprodione nor fenbuconazole are first-rate powdery mildew materials. Always follow fungicide resistance management guidelines. Current resistance management guidelines are available at <https://www.frac.info>

Cherry Powdery Mildew

Powdery mildew, caused by the fungus *Podosphaera cerasi*, is one of the most serious disease of cherries in the Pacific Northwest. The fungus attacks both foliage and (less commonly) fruit. Most cultivars are susceptible to the disease but it is particularly severe on the cultivar 'Sweetheart'. Management of the foliar phase is important because spores that infect fruit are produced on infected leaves. The fungus survives winter as chasmothecia (the sexual fruiting body); epidemics are initiated in spring when moisture results in ascospore release from the overwintering propagules. Ascospore release requires free moisture at 50F or greater. Ascospores serve as primary inoculum and give rise to powdery mildew colonies that continually produce millions of asexual spores (conidia). Conidia serve to spread and intensify the epidemic on both foliage and fruit. The disease is favored by moderate temperatures and high humidity, particularly during the two weeks before harvest. Management of powdery mildew in sweet cherries involves intensive and expensive fungicide application programs. Resistance to Group 3 (DMI) and Group 11 (QoI) fungicides has been documented in the cherry powdery mildew pathosystem. Resistance to Group 7 (SDHI) fungicides has been documented but is of quite limited distribution. Current resistance management guidelines are available at <https://www.frac.info>

Coryneum blight (shothole)

Coryneum blight or shothole, caused by *Wilsonomyces carpophilus*, is a fungal disease of minor importance in the Pacific Northwest. The fungus overwinters in twig cankers. Spores are produced on canker surfaces during early spring rains (or over-the-canopy irrigation) and are splashed to foliage and fruit where they germinate, infect, and cause small lesions. The lesions are small and circular. Necrotic lesion centers may drop giving heavily infected leaves a "shothole" appearance. The disease is managed using fungicide programs early in the growing season.

Major Fruit Protectants

Cherry Rain Cracking

Rain-Induced Cherry Cracking is often the greatest single cause of sweet cherry fruit cullage, even in the arid regions east of the Cascade Mountains in the Pacific Northwest. Cherry growers know how devastating a rain event can be if it occurs when cherries are nearing maturity. Cherry cracking has been studied for several decades, but the causes of cracking are still not fully understood.

Major Insects

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)

Shothole borer

Good sanitation (removing large wood prunings, dead limbs, and woodpiles from the orchard) is the most effective management tactic. Insecticides are only effective against adults. Beetles begin flying in late April and are active through May. The second generation flight begins in late July or early August. Yellow sticky traps placed on orchard borders will detect adult beetle activity. Spraying the border trees (rows) with high water volumes will protect the remainder of the orchard in many situations where external sources are the primary problem. Additional Details about Shothole borer

Spotted-wing drosophila

Spotted-wing drosophila (SWD) is one of the newer invasive species from Asia, first detected in the continental US in 2008, and achieving pest status in eastern Washington in 2010. Among the tree fruits, only cherries are considered to be vulnerable to attack preharvest, although like any drosophilid, SWD will use injured or rotting fruit of any type to complete development. SWD can be controlled by several groups of insecticides, and rotation among MOAs is important for resistance management. Monitoring tools are available, and should be used to gain a general idea of pest pressure in a given year. Experience since 2010 indicates that cold winters, especially those with sudden and extreme cold snaps, will decimate overwintering populations, and result in low pressure the following growing season, with little need for spray coverage. Conversely, mild winters and early springs have preceded extremely high pest pressure, necessitating a full season spray program. Additional Details about Spotted-wing drosophila

Western cherry fruit fly

Western cherry fruit fly is the key direct pest of cherries, and quarantine regulations create a zero tolerance for this pest. Adult flies lay eggs in the fruit, and the larvae feed and develop inside the fruit until they are ready to pupate. A baited yellow sticky trap can be used for monitoring adult emergence of the single generation per year, and a degree-day model is available. Females have a 7-10 day pre-oviposition period, so sprays (either canopy or bait sprays) can start about a week after first fly detection or when the model predicts emergence. Fly emergence continues after harvest, so post-harvest clean up sprays will help prevent future problems, especially if unharvested fruit remains in the orchard. Many of the materials that kill western cherry fruit fly are also effective on spotted-wing drosophila; the neonicotinyls are a notable exception. [Additional Details about Western cherry fruit fly](#)

X-disease vector leafhoppers

X-disease vector leafhoppers, primarily *Colladonus montanus reductus* and *Colladonus geminatus* vector X-disease phytoplasma, which causes fruit malformation in cherries, peaches, nectarines, and other stone fruit. *Colladonus montanus reductus* is currently the main vector and has three generations, with adults occurring in June, August, and September/October, with transmission occurring in the second and third generation. Removing the broadleaf weeds that host leafhoppers through the planting of competitive grasses and/or herbicides reduce vector abundance. Use yellow sticky traps to monitor leafhoppers and apply insecticides after harvest when vectors are present. To avoid resistance evolution, apply insecticides in at least two-week intervals and rotate insecticide classes. [Additional Details about X-disease vector leafhoppers](#)

Spray Schedule

Dormant

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Bacterial canker or gummosis	fixed copper Champ WG	8 lb	48 h	0 d	M1	NR	
	copper hydroxide Kocide 3000-O	See Label	48 h	0 d	M1	NR	

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
Black cherry aphid	petroleum oil- dormant petroleum oil- dormant	1-1.5 % v/v	12 h	none listed		NR	Organic
Cutworms	indoxacarb Avaunt Insecticide	6 oz	12 h	14 d	22	4	
Grape mealybug	diazinon Diazinon 50W	4 lb	4 d	21 d	1B	3	See label for rate limits and timing restrictions.
San Jose scale & Lecanium scale	petroleum oil- dormant petroleum oil- dormant	6 gal	12 h	none listed		NR	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.

Prebloom

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Coryneum blight (shothole)	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on label. Do not apply more than 2.88 quarts product per acre per season.
	trifloxystrobin Flint Extra	3-3.8 fl oz	12 h	1 d	11	NR	
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	copper hydroxide Kocide 3000-O	See Label	48 h	0 d	M1	NR	
	copper hydroxide + ziram Kocide 3000-O + Ziram Granuflo 76WDG	See Label See Label	48 h	30 d	M1, M3	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Black cherry aphid	diazinon Diazinon 50W	4 lb	4 d	21 d	1B	NR	Do not use until pollination is complete and bees have been removed from the area. Rate and PHI indicated is for foliar application.
Cutworms	indoxacarb Avaunt Insecticide	6 oz	12 h	14 d	22	4	

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	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. This spray timing is too early to control obliquebanded leafroller. Organic
	spinosad Entrust SC	4-8 fl oz	4 h	7 d	5	NR	Organic
	spinosad Success	4-8 fl oz	4 h	7 d	5	NR	

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
Brown rot	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	triflumizole Procure 480SC	10-16 fl oz	12 h	1 d	3	NR	Do not apply more than 96 fl oz of Procure 480SC per acre per season.
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	2.5-3.5 oz	12 h	14 d	3	NR	
	myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR	Place into solution before adding oil. Make a second application at petal fall if disease-conducive weather occurs.

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Cherry Powdery Mildew	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on label. Do not apply more than 2.88 quarts product per acre per season.
	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	Resistance to Group 11 (QoI) fungicides has been documented in the cherry powdery mildew pathosystem.
	trifloxystrobin Flint Extra	2.5-3.8 fl oz	12 h	1 d	11	NR	
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	difenoconazole Inspire	7 fl oz	12 h	0 d	3	NR	
	potassium bicarbonate Kaligreen	See Label	4 h	1 d	NC	NR	Organic
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	fluxapyroxad + pyraclostrobin Merivon	4-6.7 fl oz	12 h	0 d	7, 11	NR	
	polyoxin D zinc salt OSO 5%SC	13 fl oz	4 h	3 d	19	NR	Apply every 7-10 days. Organic
	polyoxin D zinc salt Ph-D Fungicide	6.2 oz	4 h	0 d	19	NR	Apply every 7-10 days.
	triflumizole Procure 480SC	8-16 fl oz	12 h	1 d	3	NR	Do not apply more than 96 fl oz of Procure 480SC per acre per season.
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	3.5-4 oz	12 h	14 d	3	NR	
	quinoxifen Quintec	7 fl oz	12 h	7 d	13	NR	
myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR	Place into solution before adding oil. Make a second application at petal fall if disease-conducive weather occurs.	

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	petroleum oil, summer petroleum oil, summer	1-2 % v/v	4 h	0 d		4	Do not apply to oil-sensitive varieties. Do not spray wet foliage. Do not spray when freezing temperatures are anticipated within 48 hours of an oil application, above 90°F (32°C) or when plants are under heat or moisture stress. Do not apply between pit hardening and harvest. Organic
	metrafenone Vivando	15.4 fl oz	12 h	7 d	U8	NR	Max 2 applications per year (30.8 fl oz). Do not apply with petroleum oils. Do not exceed 2 sequential applications.
Notes: Resistance to Group 11 and 3 compounds has been detected in every WA production area. However, resistance was detected in slightly greater than 50% of orchards sampled but not in every orchard. In rare cases isolates were resistant to both Groups 3 and 11. There is also some evidence of spatial variability in the distribution of resistant isolates in specific orchards.							
Coryneum blight (shothole)	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on label. Do not apply more than 2.88 quarts product per acre per season.
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.

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
Brown rot	azoxystrobin Abound	12-15.5 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on the label.
	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	
	captan Captan 50WP	4 lb	24 h	0 d	M4	NR	Do not apply Captan if oil will be used at any time for mildew control.
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	triflumizole Procure 480SC	10-16 fl oz	12 h	1 d	3	NR	Do not apply more than 96 fl. oz. per acre per season.
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	2.5-3.5 oz	12 h	14 d	3	NR	
myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR		

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Cherry Powdery Mildew	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on the label.
	micronized sulfur 80% micronized sulfur 80%	See Label	24 h	none listed	M2	NR	See label—Potential Fruit and Leaf Injury Organic
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	difenoconazole Inspire	See Label	12 h	0 d	3	NR	
	potassium bicarbonate Kaligreen	See Label	4 h	1 d	NC	NR	Organic
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	fluxapyroxad + pyraclostrobin Merivon	4-6.7 fl oz	12 h	0 d	7, 11	NR	
	polyoxin D zinc salt OSO 5%SC	13 fl oz	4 h	3 d	19	NR	Apply every 7-10 days. Organic
	polyoxin D zinc salt Ph-D Fungicide	6.2 oz	4 h	0 d	19	NR	Apply every 7-10 days.
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	triflumizole Procure 480SC	8-16 fl oz	12 h	1 d	3	NR	Do not apply more than 96 fl. oz. per acre per season.
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	4 oz	12 h	14 d	3	NR	
	quinoxifen Quintec	7 fl oz	12 h	7 d	13	NR	
petroleum oil, summer petroleum oil, summer	1-2 % v/v	4 h	0 d			4	Do not apply to oil-sensitive varieties. Do not spray wet foliage. Do not spray when freezing temperatures are anticipated within 48 hours of an oil application, above 90°F (32°C) or when plants are under heat or moisture stress. Do not apply between pit hardening and harvest. Organic

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	metrafenone Vivando	15.4 fl oz	12 h	7 d	U8	NR	Do not exceed 2 applications per year (30.8 fl oz.). Do not apply with petroleum oils. Do not exceed 2 sequential applications.
Coryneum blight (shothole)	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Fruittree leafroller	chlorantraniliprole Altacor eVo Insect Control	2.2 oz	4 h	10 d	28	NR	
	spinetoram Delegate WG	4.5-7 oz	4 h	7 d	5	NR	
Grape mealybug	imidacloprid Admire Pro	1.4-2.8 fl oz	12 h	7 d	4A	3	Do not use until pollination is complete and bees have been removed from the area. Rate and PHI indicated is for foliar application.
	acetamiprid Assail 70WP	3.4 oz	12 h	7 d	4A	3	
	buprofezin Centaur WDG	34.5 oz	12 h	14 d	16	3	
Leafrollers (Pandemis, Obliquebanded)	chlorantraniliprole Altacor eVo Insect Control	2.2 oz	4 h	10 d	28	4	
	spinetoram Delegate WG	4.5-7 oz	4 h	7 d	5	4	
	Bacillus thuringiensis subsp. kurstaki DiPel DF	See Label	4 h	0 d	11A	3	Apply when warm weather is predicted for 3 or more days. Two or three applications per pest generation may be required to achieve adequate control. Organic
	spinosad Entrust SC	4-8 fl oz	4 h	7 d	5	NR	Organic
	methoxyfenozide Intrepid 2F	8-16 fl oz	4 h	7 d	18	3	Some leafroller populations have developed resistance to Intrepid and its use could result in reduced levels of control.
	spinosad Success	4-8 fl oz	4 h	7 d	5	3-4	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.

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.

Shuck fall

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Brown rot	azoxystrobin Abound	12-15.5 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on the label.
	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	
	captan Captan 50WP	4 lb	24 h	0 d	M4	NR	Do not use Captan if using oil for mildew control.
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	triflumizole Procure 480SC	10-16 fl oz	12 h	1 d	3	NR	Do not apply more than 96 fl. oz. of PROCURE 480SC per acre per season.
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	2.5-3.5 oz	12 h	14 d	3	NR	
	myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR	Place into solution before adding oil.

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Cherry Powdery Mildew	azoxystrobin Abound	11-15.5 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on label.
	micronized sulfur 80% micronized sulfur 80%	See Label	24 h	none listed	M2	NR	See label—Potential Fruit and Leaf Injury Organic
	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	Resistance to Group 11 (QoI) fungicides has been documented in the cherry powdery mildew pathosystem.
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	flutianil Gatten Fungicide	See Label	12 h	3 d	U13	NR	Maximum Application Rate: 8.0 fl oz product/A (0.0264 lb ai/A). DO NOT apply more than 4 applications per year. DO NOT exceed a maximum of 0.1056 lbs ai per acre per year. DO NOT apply within 3 days of harvest.
	difenoconazole Inspire	7 fl oz	12 h	0 d	3	NR	
	potassium bicarbonate Kaligreen	See Label	4 h	1 d	NC	NR	Organic
	fluopyram Luna Privilege	4.0 - 6.84 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	pydiflumetofen Miravis	5.1 fl oz	12 h	0 d	7	NR	
	polyoxin D zinc salt OSO 5%SC	13 fl oz	4 h	3 d	19	NR	Apply every 7-10 days. Organic
	polyoxin D zinc salt Ph-D Fungicide	6.2 oz	4 h	0 d	19	NR	Apply every 7–10 days.
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	triflumizole Procure 480SC	16 fl oz	12 h	1 d	3	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
metconazole Quash	3.5-4 oz	12 h	14 d	3	NR		

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	quinoxyfen Quintec	7 fl oz	12 h	7 d	13	NR	
	myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR	Place into solution before adding oil.
	cyflufenamid Torino Fungicide	4-8 fl oz	4 h	6 d	U6	4	Do not make more than two (2) applications per year. Do not apply more than once every seven (7) days. Do not exceed a total of 0.106 lbs. active ingredient (16.0 oz. of product) per acre per calendar year. Do not apply within six (6) days of harvest; (PHI = 6 days)
	petroleum oil, summer petroleum oil, summer	1-2 % v/v	4 h	0 d		4	Do not apply to oil-sensitive varieties. Do not spray wet foliage. Do not spray when freezing temperatures are anticipated within 48 hours of an oil application, above 90°F (32°C) or when plants are under heat or moisture stress. Do not apply between pit hardening and harvest. Organic
	Notes: Resistance to Group 11 and 3 compounds has been detected in every WA production area. However, resistance was detected in slightly greater than 50% of orchards sampled but not in every orchard. In rare cases isolates were resistant to both Groups 3 and 11. There is also some evidence of spatial variability in the distribution of resistant isolates in specific orchards.						
Coryneum blight (shothole)	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on label. Do not apply more than 2.88 quarts product per acre per season.
	captan Captan 50WP	4 lb	24 h	0 d	M4	NR	Do not use Captan if using oil for mildew control.
	fluxapyroxad + pyraclostrobin Merivon	4-6.7 fl oz	12 h	0 d	7, 11	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Black cherry aphid	imidacloprid Admire Pro	1.4-2.8 fl oz	12 h	7 d	4A	NR	
	acetamiprid Assail 70WP	2.3 oz	12 h	7 d	4A	NR	
Leafrollers (Pandemis, Obliquebanded)	chlorantraniliprole Altacor eVo Insect Control	2.2 oz	4 h	10 d	28	4	
	spinetoram Delegate WG	4.5-7 oz	4 h	7 d	5	4	
	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. Organic
	spinosad Entrust SC	4-8 fl oz	4 h	7 d	5	NR	Organic
	pyriproxyfen Esteem 35WP	4-5 oz	12 h	14 d	7C	4	Time pyriproxyfen to coincide with the presence of the last larval stage but before pupae are present.
	methoxyfenozone Intrepid 2F	8-16 fl oz	4 h	7 d	18	3	
	spinosad Success	4-8 fl oz	4 h	7 d	5	3-4	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.

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

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Brown rot	micronized sulfur 80% micronized sulfur 80%	See Label	24 h	none listed	M2	NR	See label—Potential Fruit and Leaf Injury Organic
	captan Captan 50WP	4 lb	24 h	0 d	M4	NR	
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
metconazole Quash	2.5-3.5 oz	12 h	14 d	3	NR		

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Cherry Powdery Mildew	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Abound is extremely phytotoxic to certain apple varieties. See Application Directions, Resistance Management, and Attention information on label.
	micronized sulfur 80% micronized sulfur 80%	See Label	24 h	none listed	M2	NR	See label—Potential Fruit and Leaf Injury Organic
	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	Resistance to Group 11 (QoI) fungicides has been documented in the cherry powdery mildew pathosystem.
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	flutianil Gatten Fungicide	See Label	12 h	3 d	U13	NR	Maximum Application Rate: 8.0 fl oz product/A (0.0264 lb ai/A). DO NOT apply more than 4 applications per year. DO NOT exceed a maximum of 0.1056 lbs ai per acre per year. DO NOT apply within 3 days of harvest.
	difenoconazole Inspire	See Label	12 h	0 d	3	NR	
	potassium bicarbonate Kaligreen	See Label	4 h	1 d	NC	NR	Organic
	fluopyram Luna Privilege	4.0 - 6.84 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	fluxapyroxad + pyraclostrobin Merivon	4-6.7 fl oz	12 h	0 d	7, 11	NR	
	pydiflumetofen Miravis	3.4 - 5.1 fl oz	12 h	0 d	7	NR	
	polyoxin D zinc salt OSO 5%SC	13 fl oz	4 h	3 d	19	NR	Apply every 7–10 days. Organic
	polyoxin D zinc salt Ph-D Fungicide	6.2 oz	4 h	0 d	19	NR	Apply every 7–10 days.
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	triflumizole Procure 480SC	16 fl oz	12 h	1 d	3	NR	
azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.	

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	metconazole Quash	3.5-4 oz	12 h	14 d	3	NR	
	quinoxifen Quintec	7 fl oz	12 h	7 d	13	NR	
	myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR	Place into solution before adding oil.
	cyflufenamid Torino Fungicide	4-8 fl oz	4 h	6 d	U6	4	Do not make more than two (2) applications per year. Do not apply more than once every seven (7) days. Do not exceed a total of 0.106 lbs. active ingredient (16.0 oz. of product) per acre per calendar year. Do not apply within six (6) days of harvest; (PHI = 6 days)
	petroleum oil, summer petroleum oil, summer	1-2 % v/v	4 h	0 d		4	Do not apply to oil-sensitive varieties. Do not spray wet foliage. Do not spray when freezing temperatures are anticipated within 48 hours of an oil application, above 90°F (32°C) or when plants are under heat or moisture stress. Do not apply between pit hardening and harvest. Organic
	metrafenone Vivando	15.4 fl oz	12 h	7 d	U8	NR	Max 2 applications per year (30.8 fl oz.). Do not apply with petroleum oils. Do not exceed 2 sequential applications.
	Notes: Resistance to Group 11 and 3 compounds has been detected in every WA production area. However, resistance was detected in slightly greater than 50% of orchards sampled but not in every orchard. In rare cases isolates were resistant to both Groups 3 and 11. There is also some evidence of spatial variability in the distribution of resistant isolates in specific orchards.						
Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Cherry rust mite	fenbutatin oxide Vendex 50WP	1-2 lb	48 h	14 d	12B	NR	
Grape mealybug	imidacloprid Admire Pro	1.4-2.8 fl oz	12 h	7 d	4A	3	Do not use until pollination is complete and bees have been removed from the area. Rate and PHI indicated is for foliar application.
	acetamiprid Assail 70WP	3.4 oz	12 h	7 d	4A	3	
	buprofezin Centaur WDG	34.5 oz	12 h	14 d	16	3	
	diazinon Diazinon 50W	4 lb	4 d	21 d	1B	3	See label for rate limits and timing restrictions.

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Leafrollers (Pandemis, Obliquebanded)	chlorantraniliprole Altacor eVo Insect Control	2.2 oz	4 h	10 d	28	4	
	spinetoram Delegate WG	4.5-7 oz	4 h	7 d	5	4	
	Bacillus thuringiensis subsp. kurstaki DiPel DF	See Label	4 h	0 d	11A	3	Two or three applications are usually required to achieve acceptable control of high populations. Organic
	spinosad Entrust SC	4-8 fl oz	4 h	7 d	5	NR	Organic
	pyriproxyfen Esteem 35WP	4-5 oz	12 h	14 d	7C	4	
	methoxyfenozide Intrepid 2F	8-16 fl oz	4 h	7 d	18	3	Some leafroller populations have developed resistance to Intrepid and its use could result in reduced levels of control.
	spinosad Success	4-8 fl oz	4 h	7 d	5	3-4	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.
Peachtree Borer	Peach Tree Borer pheromone Isomate-P	See Label	none listed	none listed		NR	
Pear slug	chlorantraniliprole Altacor eVo Insect Control	2.2 oz	4 h	10 d	28	NR	
	spinetoram Delegate WG	4.6 oz	4 h	7 d	5	NR	
	lambda-cyhalothrin Warrior II	1.5 fl oz	24 h	14 d	3	NR	Pyrethroids are broadly toxic to predatory mites, and repeated use of such products may cause mite flare-ups.
San Jose scale & Lecanium scale	buprofezin Centaur WDG	34.5 oz	12 h	14 d	16	4	Oil at delayed dormant is critical to the success of San Jose scale management.
	pyriproxyfen Esteem 35WP	4-5 oz	12 h	14 d	7C	4	Time pyriproxyfen to coincide with the presence of the last larvae stage but before pupae appear. Timing for leafrollers should also provide control of scale.
Shothole borer	esfenvalerate Asana XL	14.5 fl oz	12 h	14 d	3A	4	Sanitation is the most effective management for shothole borer.

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Spider mites	bifenazate Acramite 50WS	1 lb	12 h	3 d	un	4	
	spirodiclofen Envidor 2SC	18 fl oz	12 h	7 d	23	3-4	
	hexythiazox Onager	12-24 fl oz	12 h	7 d	10A	NR	
	fenbutatin oxide Vendex 50WP	1-2 lb	48 h	14 d	12B	NR	
	etoxazole Zeal Miticide1 72WSP	3 oz	12 h	7 d	10B	3-4	
Spotted-wing drosophila	spinetoram Delegate WG	7 oz	4 h	7 d	5	NR	
	spinosad Entrust SC	8 fl oz	4 h	7 d	5	NR	There is a Washington 24(c) label for Entrust that allows a shorter preharvest interval, but has more restrictions on rates and timing. See label. Organic
	cyantraniliprole Exirel Insect Control	13.5-20.5 fl oz	12 h	3 d	28	3	
	malathion Malathion ULV	16 fl oz	12 h	1 d	1B	NR	Apply malathion ULV by air only (ULV is NOT mixed with any water) (see text--Aerial Application). Activity against spotted-wing drosophila is only a few days.
	spinosad Success	8 fl oz	4 h	7 d	5	NR	
	lambda-cyhalothrin Warrior II	2.56 fl oz	24 h	14 d	3	NR	Pyrethroids are broadly toxic to predatory mites, and repeated use of such products may cause mite flare-ups.

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Western cherry fruit fly	imidacloprid Admire Pro	1.4-2.1 fl oz	12 h	7 d	4A	NR	
	acetamiprid Assail 70WP	2.3-3.4 fl oz	12 h	7 d	4A	NR	
	spinetoram Delegate WG	4-4.5 oz	4 h	7 d	5	NR	
	spinosad Entrust SC	4.8-6 fl oz	4 h	7 d	5	NR	Organic
	spinosad GF-120 NF Naturalyte	20 fl oz	4 h	0 d	5	NR	This is a spinosad formulation registered specifically for management of Tephritid fruit flies. This product has not proven sufficiently effective for the control of spotted wing drosophila. Monitor carefully for SWD if you use this bait. Apply to alternate rows with special auxiliary applicator; dilute with no more than 3 quarts of water per acre. Re-apply after rain. For application method, see label. Organic
	malathion Malathion ULV	16 fl oz	12 h	1 d	1B	NR	Apply malathion ULV by air only (ULV is NOT mixed with any water) (see text--Aerial Application). Activity against spotted-wing drosophila is only a few days.
	carbaryl Sevin XLR Plus	4 pt	12 h	3 d	1A	NR	WARNING: Multiple applications of carbaryl may cause mite problems.
	spinosad Success	4-6 fl oz	4 h	7 d	5	NR	

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 and harvest

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Brown rot	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	2.5-3.5 oz	12 h	14 d	3	NR	

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Cherry Powdery Mildew	azoxystrobin Abound	11-15 fl oz	4 h	0 d	11	NR	Azoxystrobin is extremely toxic to certain apple varieties. See label for further information.
	pyraclostrobin Cabrio	9.5 oz	12 h	0 d	11	NR	Resistance to Group 11 (QoI) fungicides has been documented in the cherry powdery mildew pathosystem.
	penthiopyrad Fontelis	14-20 fl oz	12 h	0 d	7	NR	
	difenoconazole Inspire	See Label	12 h	0 d	3	NR	
	potassium bicarbonate Kaligreen	See Label	4 h	1 d	NC	NR	Organic
	fluopyram Luna Privilege	4.0 - 6.84 fl oz	12 h	0 d	7	NR	
	fluopyram + trifloxystrobin Luna Sensation	5-5.6 fl oz	12 h	1 d	7, 11	NR	
	fluxapyroxad + pyraclostrobin Merivon	4-6.7 fl oz	12 h	0 d	7, 11	NR	
	pydiflumetofen Miravis	5.1 fl oz	12 h	0 d	7	NR	
	polyoxin D zinc salt OSO 5%SC	13 fl oz	4 h	3 d	19	NR	Apply every 7–10 days. Organic
	polyoxin D zinc salt Ph-D Fungicide	6.2 oz	4 h	0 d	19	NR	Apply every 7–10 days.
	pyraclostrobin + boscalid Pristine Fungicide	10.5-14.5 oz	12 h	0 d	11,7	NR	
	triflumizole Procure 480SC	16 fl oz	12 h	1 d	3	NR	
	azoxystrobin + difenoconazole Quadris Top	12-14 fl oz	12 h	0 d	11, 3	NR	The azoxystrobin component of Quadris Top is extremely toxic to certain apple varieties. See label for further information.
	metconazole Quash	3.5-4 oz	12 h	14 d	3	NR	
quinoxifen Quintec	7 fl oz	12 h	7 d	13	NR		
myclobutanil Rally 40WSP	5 oz	24 h	0 d	3	NR	Place into solution before adding oil. See remarks in shuck fall section.	

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	metrafenone Vivando	15.4 fl oz	12 h	7 d	U8	NR	Max 2 applications per year (30.8 fl oz.). Do not apply with petroleum oils. Do not exceed 2 sequential applications.
	Notes: Resistance to Group 11 and 3 compounds has been detected in every WA production area. However, resistance was detected in slightly greater than 50% of orchards sampled but not in every orchard. In rare cases isolates were resistant to both Groups 3 and 11. There is also some evidence of spatial variability in the distribution of resistant isolates in specific orchards.						
Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Spotted-wing drosophila	spinetoram Delegate WG	7 oz	4 h	7 d	5	NR	
	spinosad Entrust SC	8 fl oz	4 h	7 d	5	NR	There is a Washington 24(c) label for Entrust that allows a shorter preharvest interval but has more restrictions on rate and timing. See label. Organic
	malathion Malathion ULV	16 fl oz	12 h	1 d	1B	NR	Apply malathion by air only, ULV, not mixed with water. See text—Aerial Application. Activity against spotted-wing drosophila is only a few days.
	spinosad Success	8 fl oz	4 h	7 d	5	NR	
	lambda-cyhalothrin Warrior II	2.56 fl oz	24 h	14 d	3	NR	Pyrethroids are broadly toxic to predatory mites, and repeated use of such products may cause mite flare-ups.

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Western cherry fruit fly	imidacloprid Admire Pro	1.4-2.8 fl oz	12 h	7 d	4A	NR	Rate and PHI indicated is for foliar application.
	spinetoram Delegate WG	4-4.5 oz	4 h	7 d	5	NR	
	spinosad Entrust SC	4-6 fl oz	4 h	7 d	5	NR	Organic
	spinosad GF-120 NF Naturalyte	20 fl oz	4 h	0 d	5	NR	This is a spinosad formulation registered specifically for management of Tephritid fruit flies. This product has not proven sufficiently effective for the control of spotted wing drosophila. Monitor carefully for SWD if you use this bait. Apply to alternate rows with special auxiliary applicator; dilute with no more than 3 quarts of water per acre. Re-apply after rain. Organic
	malathion Malathion ULV	16 fl oz	12 h	1 d	1B	NR	Apply malathion by air only, ULV, not mixed with water. See text—Aerial Application.
	carbaryl Sevin XLR Plus	4 pt	12 h	3 d	1A	NR	WARNING: Multiple applications of carbaryl may cause mite problems.
	spinosad Success	4-6 fl oz	4 h	7 d	5	NR	

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.

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	azadirachtin Aza-Direct Botanical Insecticide	1-2 pt	4 h	0 d	un	1-3	Aza-direct at 32oz provided 62%, 78% control of white apple leafhopper and 63%, 25% of potato leaf hopper in apples [Wise 2002]. Azadirect 32oz provided 64% of control for potato leafhopper nymphs [Harding 2019]. Organic
	Azadirachtin, Pyrethrin Azera Insecticide	56 fl oz	12 h	0 d	3A	3	Azera (premix of pyrethrins 1.4% and azadirachtin 1.2%) achieved 100% mortality of C. reductus 24 hours after treatment in 2020 WA trial [Nottingham 2020-2021]. Residual control is unknown. Azera 40oz provided 64% of control for potato leafhopper nymphs [Harding 2020]. Organic
	flonicamid Beleaf 50 SG Insecticide	2.8 oz	12 h	14 d	29	2-4	In contact bioassays caused 90% mortality 1 day after treatment and 30% mortality to 85% mortality 1 to 2 days after treatment respectively (Northfield 2023, Orpet 2022).
	tolfenpyrad Bexar	21 fl oz	12 h	14 d	21A	NR	Additional testing is needed, but an initial lab bioassay showed 65% mortality of C. reductus [Nottingham 2020-2021].
	diatomaceous earth Celite 610	50 lb	none listed	none listed	particle film	3-4	Celite reduced leafhoppers from colonizing leaves compared to 1% oil by 50% and to untreated checks by 85% in 4 experiments [Nottingham 2021]. Organic
	cinnamon oil Cinnerate	32 fl oz	none listed	0 d	un	3	67 % mortality of C. reductus in 2020 WA trial [Nottingham 2020]. Organic
	fenpropathrin Danitol 2.4EC	18 fl oz	24 h	3 d	3	2-4	It is generally recommended that no more than 2 Danitol 2.4 EC apps per season. Danitol had 68-94% control in four California trials at 0.2 and 0.4 lb AI/a [Steenwyk 1993].
	spinosad Entrust SC	8 fl oz	4 h	7 d	5	1-2	32% control of C. reductus in 2020 WA trial [Nottingham 2020]. Organic
	malathion Malathion 5EC	2.8 pt	12 h apricot/cherry/pear 24 h peach/nectarine	3 d	1B	NR	Additional testing is needed, but an initial lab bioassay showed 100% mortality of C. reductus [Nottingham 2020-2021].

Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
	azadirachtin Neemix 4.5%L	16 fl oz	4 h	0 d	un	1-3	Neemix was not different than the check for controlling of <i>C. reductus</i> [Nottingham 2021]. Neemix at 3.5 and 7 fl oz provided little control compared to the check (Sevin) for white apple leafhoppers for first or second generations [Beers 1995]. Neemix 4.5 at 8 oz provided 67% control potato leafhopper adults 7 days after treatment [Patton 2002]. Organic
	spinosad Success	2-2.7 fl oz	4 h	7 d	5	3	Rated as good efficacy on White apple leafhopper in WA.
	kaolin clay Surround WP	25-50 lb	4 h	0 d	particle film	3-4	Kaolin confuses insects where they don't recognize the plants to feed. Two initial post-harvest applications, followed by monthly reapplication of Surround at 50 lb/A reduced leafhopper numbers 20-80% in traps in 2020 WA study [Northfield 2020]. Kaolin reduced leafhoppers from colonizing leaves compared to 1% oil by 50% and to untreated checks by 85% [Nottingham 2021]. Kaolin reduced disease transmission of Pierces disease by glassy winged sharpshooters better than conventional products in one trial [25]. 100% control of white apple leafhoppers [Wise 2002]. Surround + Trilogy 49% control potato leafhopper adults 7 days after treatment [Patton 2002]. Organic
	sulfoxaflor Transform	2.75 oz	24 h	7 d	4C	3-4	Laboratory bioassays show 85-95% mortality of <i>C. reductus</i> [Nottingham 2021].
	petroleum oil, summer petroleum oil, summer	2 gal	4 h	0 d		3	Oil at 1% reduced leafhoppers in choice tests by 75% [Nottingham 2021] Oil at 2% reduced White apple leafhopper oviposition resulting in fewer nymphs [Fernandez 2001]. Organic
	lambda-cyhalothrin Warrior II	2.56 fl oz	24 h	14 d	3	NR	95% control potato leafhoppers [Laub 2003]. For potato leafhoppers Warrior II CS at 1.9 fl oz had number 40% lower than untreated control (not sig.) [Kuhar 2009]
	geraniol 30%, peppermint oil 1%, cottonseed oil 0.1%, rosemary oil 0.01% Wrath Insecticide	32 fl oz	not stated	0 d	UNE	3	21% control 1 day after treatment and 84% control at 32 fl oz rate 4 days after treatment compared to 92% and 100% in treated control of Pyganic in a lab bioassay (Orpet 2023). 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.

Fall

Disease	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
Bacterial canker or gummosis	fixed copper Champ WG	See Label	48 h	0 d	M1	NR	
	copper hydroxide Kocide 3000-O	See Label	48 h	0 d	M1	NR	
Insect	Chemical	Rate per Acre	REI	PHI	MOA	Eff.	Notes
X-disease vector leafhoppers	carbaryl carbaryl	3 qt	12 h	3 d	1A	2-4	Can cause leaf-drop in Canadian varieties. Use fall only. Sevin had 50-90% in 5 CA. [Van Steenwyk 1988].

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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