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Utah Fruit Pest Control Handbook

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UTAH FRUIT PEST CONTROL HANDBOOK

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An additional reference that you may find helpful is the *1998 Crop Protection Guide for Tree Fruits in Washington* (Pub. #EB0419). However, some control recommendations in the *Crop Protection Guide for Tree Fruits in Washington* should be modified for Utah conditions.

There are several diseases listed in the Washington Crop Protection Guide that do not occur in Utah. Consult the list of diseases in the Utah Spray Guide for local disease control recommendations.

Follow the Utah recommendations for powdery mildew control of apples. Washington recommends Lime Sulfur and Calcium Polysulfide which are fairly ineffective here in Utah. We recommend Bayleton, Procure, Rally, Rubigan, and Benlate as the primary mildew fungicides.

The insect and mite control recommendations in the Washington Spray Guide are, in general, very similar to recommendations for Utah. However, some pests that occur in Washington are not problems in Utah. Consult the Utah spray guide for the most appropriate local insect control recommendations. Consult the predator toxicity guide when making pesticide selections to help reduce negative effects of sprays on beneficials.

Since changes to the pesticide regulations are occurring almost daily, it is important to check the pesticide labels on a regular basis for any changes. The label rates and uses supersede anything written in this update. Always check and follow pesticide pre-harvest intervals, and note that they may vary among crops. If there are any questions about the products listed, please check the label for verification.

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PREDATOR TOXICITY GUIDE

The predator toxicity table is intended as a guide to the relative toxicity of commonly applied pesticides to the beneficial western orchard predatory mite *(Typhlodromus occidentalis)*, apple rust mite, and aphid predators (lady beetles, lacewings, and syrphids). If possible, select chemicals with the lowest toxicities.

			Toxicity Rating[a]					
Compound	**Trade Name**	**Rate/Acre**	**Typhlodromus**	**Apple Rust Mite**	**Ladybeetles**	**Lacewings**	**Syrphids**	**Comments**
abamectin	Agri-Mek	10-20 fl oz	††††	††††	††††	—	—	
amitraz	Mitac	3 lbs	††††	—	—	—	—	Avoid using when weather is hot; can cause mite flare-ups
azinphosmethyl	Guthion 50WP	2-3 lbs	†	†	††††	††††	—	
Bacillus thuringiensis (Bt)	Biobit, Dipel, Javelin, MVP	1-2 lbs 2-3 qt	† †	† †	† †	† †	† †	
carbaryl	Sevin 50WP	2 lbs	††††	††	††††	††††	††††	Usually no problems if applied early in the season (before June)
chlorpyrifos	Lorsban 4E Lorsban 50WP	2-4 pts 3-4 lbs	†† ††	† †	††††	††††	— —	Limit use because of high toxicity Limit use because of high toxicity
clofentezine	Apollo 50SC	4-8 fl oz	†	†	—	—	—	
diazinon	Diazinon 50WP	4 lbs	†	†	††††	††††	††	
dimethoate	Dimethoate 2.67EC	2 qts	††	†	††	††††	††††	Limit use because of high toxicity
encapsulated methyl parathion	Penncap-M 2F	6-8 pts	†	†	††††	—	—	
endosulfan	Thiodan 50WP	3 lbs	†	††††	††††	†	††††	
esfenvalerate	Asana 0.66EC	1 pt	††††	†	††††	††††	—	Limit use because of high toxicity
fenbutatin-oxide	Vendex 4L Vendex 50WP	2 pts 1.5 lbs	†††† ††††	†††† ††††	— †	†††† ††††	— —	Limit use because of high toxicity
formetanate hydrochloride	Carzol 92SP	1.5 lbs	††††	††††	†	—	—	Best if used early in the season (before June). Highly toxic to bees

[a] Rating System: †††† = highly toxic; likely to cause pest mite or insect outbreaks
†††† = fairly toxic; avoid if possible; avoid high rates or frequent use
†† = somewhat toxic; will reduce predators some
† = relatively nontoxic
— = no information available

			Toxicity Rating[a]					
Compound	Trade Name	Rate/Acre	Typhlodromus	Apple Rust Mite	Ladybeetles	Lacewings	Syrphids	Comments
hexythiazox	Savey 50WP	4-6 oz	†	†	—	—	—	
imidacloprid	Provado 1.6F	4-8 fl oz	†	†	††	—	—	
lime-sulfur		6 gals	†††	††††	—	—	—	Avoid using when weather is hot; can cause mite flare-ups
methidathion	Supracide 2E	4 pts	†††	†	—	—	—	Do not use beyond the delayed dormant period
methomyl	Lannate 1.8L	2 pts	††††	†	††††	††	—	Limit use because of high toxicity
oil (dormant)	Superior or Supreme oil	4-6 gals	†	†	††	††	††	Do not use beyond the delayed dormant period
oil (in-season)	Horticultural oil	1-2% v/v	††	††	†	—	—	
oxamyl	Vydate 2L	2-4 pts	†††	—	†††	—	—	Limit use because of high toxicity
oxythioquinox	Morestan 25WP	4-6 lbs	†††	†††	—	—	—	
permethrin	Ambush 2EC or	20 fl oz	††††	†	†††	††	—	Limit use because of high toxicity
	Pounce 3.2EC	4-8 fl oz	††††	†	†††	††	—	Limit use because of high toxicity
phosmet	Imidan 70WP	3-4 lbs	†	†	†††	†††	—	
propargite	Omite 30WP	5 lbs	††	††	—	—	—	

[a] Rating System: †††† = highly toxic; likely to cause pest mite or insect outbreaks
††† = fairly toxic; avoid if possible; avoid high rates or frequent use
†† = somewhat toxic; will reduce predators some
† = relatively nontoxic
— = no information available

RELATIVE EFFECTIVENESS OF SOME FUNGICIDES FOR APPLE DISEASE MANAGEMENT

Fungicide	Scab	Powdery mildew
Benomyl (Benlate)	good[a]	excellent[a]
Captan	good	none
dodine (Syllit)	excellent[a]	none
fenarimol (Rubigan)	excellent	excellent
mancozeb	good	none
myclobutanil (Rally)	excellent	excellent
sulfur	slight	good
thiophanate-methyl (Fungo)	good[a]	excellent[a]
triadimefon (Bayleton)	fair	excellent
ziram	fair	none

Excerpted and modified from *Cornell Recommendations for Commercial Tree-Fruit Production*. [a] Resistance to these fungicides is possible with repeated use. There is no resistance known in Utah yet.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

APPLE SPRAY GUIDE

(Apples)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Dormant or Post-harvest	Phytophthora root rot	1. Ridomil 2E	See label	See label	Apply as broadcast spray in a band under trees or as a drench.
Green tip	Fire blight, European red mite, San Jose scale, aphids, leafrollers	1. Fixed copper + dormant oil + an organophosphate: Supracide 2EC or Lorsban 4E	 1 ½ gal 1 pt 1 pt	 4 pt 4 pt	See rates for fire blight alone Tank mix of three products is probably compatible. However, be advised that all possible combinations have not been tested. Use caution and test on small area.
Silver tip-Green tip	Fire blight (alone)	Kocide 101 + dormant oil or Copper Count N + dormant oil or Copper sulfate + dormant oil or Bordeaux mixture + dormant oil	2-4 lb + 2 qts 2-4 qts + 2 qts 2-4 lbs+ 2 qts 8-8-100 + 1 gal	8-16 lbs + 2 gals 8-16 qts + 2 gals 8-16 lbs + 2 gals	Use Silver Tip spray when overwintering inoculum is high. Oil improves activity of the copper. Mix 8 lbs copper sulfate in 100 gal water then add 8 lbs hydrated spray lime and then 1 gal oil.
Green tip-Post bloom	Phytophthora root rot	1. Aliette	2 ½-5 lb	Do not exceed 20 lb Aliette/season	Use up to four foliar applications
Green tip - Half-inch green	European red mite, brown mite, San Jose scale, aphids, leafrollers, Campylomma bug	1. Superior or Supreme oil + an organophosphate: Supracide 2EC or Lorsban 4E	1 ½ gal 1 pt 1 pt	 4 pt 4 pt	EC formulations are recommended with oil. If a history of Campylomma problems, use Lorsban in delayed dormant spray.
	European red mite (alone)	1. Superior or Supreme oil	1 ½ gal		
Half-inch green	Apple scab	1. Syllit 65WP (dodine) 2. Benlate 50WP + Captan 50WP 3. Captan 50WP	6 oz 3 oz + 1 lb 2 lb	1-3 lb 1 lb + 4-5 lb 8-10 lb	Routine scab controls are usually not necessary; check with county agent before use; check the label of each fungicide for proper timing of an application in relation to infection period.

Continued

(Apples)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Half-inch green	Apple scab	4. Funginex 18.2EC	10 oz	36-40 lb	Do not apply after petal fall.
		5. Mancozeb 80WP	3/4-1 ½ lb	3-6 lb	
		6. Rubigan 12EC	3 oz	9-12 oz	Rally, Rubigan and Procure can be used as protectants or eradicants up to three days following an infection period.
		7. Rally 40W	1 1/4-2 ½ oz	5-8 oz	
		8. Procure 50WS	2-4 oz	8-16 oz	
		9.Topsin M 20W	1/4-3/8 lb	1-1 ½ lb	
Half-inch green - Tight cluster	Lygus bug, stink bugs	1. Thiodan 50WP	1 lb	4 lb	EC formulations are recommended if using with oil.
		2. Thiodan 3EC	2/3 qt	22/3 qt	
		3. Lorsban 50WP	3/4 lb	3 lb	
		4. Lorsban 4E	1 pt	4 pt	
	Cutworms	1. Thiodan 50WP	1 lb		Apply to lower trunk and ground vegetation if needed.
		2. Thiodan 3EC	2/3 qt		
		3. Lorsban 50WP	½-1 lb		
		4. Lorsban 4E	½-1 pt		
		5. Bacillus thuringiensis (Biobit, Dipel, Javelin, MVP)	½-1 lb		
Tight cluster - Full pink	Powdery mildew	1. Bayleton 50WP	0.5-2 oz	2-8 oz	Do not exceed 24 oz/acre/year. No closer than 45 days from harvest.
		2. Benlate 50WP	2-3 oz	8-16 oz	
		3. Benlate 50WP + summer oil	2-3 oz +1 qt	8-12 oz +1 gal	Use the higher rate of Benlate + oil on mildew susceptible varieties.
		4. Funginex	9-10 oz	36-40 oz	
		5. Rubigan EC	2 1/4-3 oz	9-12 oz	
		6. Rally 40WP	11/4-2 ½ oz	5-10 oz	
		7. Procure 50WS	2-4 oz	8-16 oz	Do not apply within 14 days of harvest.
		8. Morestan 25WP	½-1 lb	1-4 lb	Do not apply after bloom; do not apply oil 10 days before or after Morestan; no other fungicides needed for mildew during bloom; also a miticide, but harmful to predatory mites.
		9. Sulfur 51F	2-3 pt	1-1.5 gal	Must be applied every 7-8 days to be effective.
		10. Sulfur 92WP	6-8 lb	24-32 lb	
		11. Topsin M 70W	1/4-3/8 lb	1-1 ½ lb	
	Green apple aphid, Rosy apple aphid, stink bugs, cutworms, leafrollers	1. Thiodan 3EC	1.4 pt	2.7-3.3 qt	Only use if delayed dormant was missed.
		2. Thiodan 50WP	1 lb	3-4 lb	
		3. Diazinon 50WP	1 lb	4-5 lb	
		4. Dimethoate 4EC	½-1 pt	2-4 pt	28-day pre-harvest interval.
		5. Lorsban 50WP	3/4 lb	3 lb	May russet Golden Delicious.
	San Jose scale	1. Lorsban 50WP	3/4 lb	3 lb	Only if scale is a serious problem or delayed dormant spray was missed.
		2. Diazinon 50WP	1lb	4 lb	

(Apples)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Tight cluster - Full pink	Western flower thrips	1. Carzol 92SP	1/4 lb	1 lb	Apply before bees are placed in orchard; apply late evening or at night; toxic to predatory mites; avoid spraying lower trunk and ground cover.
	Western tentiform leafminer	1. Vydate 2L	½ pt	1 qt	Use only when population pressure is extremely high; toxic to predatory mites; avoid spraying lower trunk and ground cover.
Pink - Petal fall	Campylomma bug	1. Carzol 92SP 2. Thiodan 50WP 3. Diazinon 50WP 4. Lorsban 50WP	1/8-1/4 lb 3/4-1 lb 1 lb 2/5-3/4 lb	½-1 lb 3-4 lb 4 lb 1 ½-3 lb	Only a problem in some areas of Utah; don't treat unless necessary following sampling for nymphs; apply treatment immediately if nymphs are detected prior to bloom; after blossoms open, apply Carzol only at night to avoid hazard to bees; adults are beneficial predators.
First bloom	Apple scab				See fungicides for scab control at half-inch green stage.
First bloom - Full bloom	Fire blight (when conditions are conducive for infection)	1. Streptomycin 17% 2. Fixed coppers (tribasic copper sulfate, Zinc Coposil, or copper hydroxide)	8 oz See labels	24-32 oz See labels	Check with county agent for high risk days, otherwise, begin application when daily mean temperature exceeds 60°F; repeat at three to five-day intervals during bloom if weather remains warm and rain occurs.
Full bloom	Apple scab				See fungicides for scab control at half-inch green stage.
Petal fall	Powdery mildew	1. Bayleton 50WP 2. Benlate 50WP 3. Benlate 50WP + summer oil 4. Funginex 1.6EC 5. Rally 40WP 6. Rubigan EC 7. Procure 50WS 8. Sulfur 51F 9. Sulfur 92WP 10. Topsin M 70W	0.5-2 oz 2-3 oz 2 oz + 1 qt 10 oz 11/4-2 oz 2 1/4-3 oz 2-4 oz 1 ½-3 pt 6-8 lb 1/4-3/8 lb	2-8 oz 8-12 oz 8 oz + 1 gal 2.5 pt 5-10 oz 9-12 oz 8-16 oz 2 qt 24-32 lb 1-1 ½ lb	Do not exceed 24 oz/acre/year. No closer than 45 days before harvest. Use Benlate + oil for susceptible varieties or heavy infections. Do not apply after petal fall. Avoid using sulfur products when temperatures exceed 90°F; must be applied every 7-8 days to obtain consistent control; watch for mite population increases.
	White apple leafhopper	1. Thiodan 50WP 2. Provado 1.6F 3. Diazinon 50WP 4. Sevin 50WP 5. Carzol 92SP	3/4 lb 1-2 fl oz 1 lb 3/4 lb 1/4 lb	3 lb 4-8 fl oz 4-6 lb 3-6 lb 1 lb	Apply when nymphs are primarily 3rd - 4th instars. Apply postbloom only. Resistance problems with diazinon. If used for thinning, is very effective if there is adequate spray coverage. Toxic to predatory mites; best if used before June 1.

(Apples)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Petal fall	European red mite	1. Vendex 50WP	1/4-½ lb	1-2 lb	Check for live ERM at petal fall; apply if needed.
		2. Vendex 4L	4-8 fl oz	1-3 pt	Avoid spraying lower trunk and ground cover where it will contact predatory mites.
		3. Savey 50WP	See label	See label	Savey is an ovicide; target egg stage for control. When population is high, combine with an adulticide.
		4. Pyramite	2.2 oz	4.4-6.6 oz	
	Leafrollers, climbing cutworms, Lygus bug, stink bugs	1. Thiodan 50WP	1 lb	4 lb	
		2. Diazinon 50WP	1 lb	4 lb	
Summer sprays	Codling moth, leafrollers	1. Guthion 50WP	½-3/4 lb	2-3 lb	First application for codling moth should occur 250 degree-days after the date of first continuous moth catch (biofix) in pheromone traps. Apply second spray based on product protection interval and codling moth pressure. Penncap-M is highly toxic to bees. Mow ground cover before application.
		2. Imidan 70WP	3/4-1/4 lb	3-4 ½ lb	
		3. Diazinon 50WP	1 lb	4-5 lb	
		4. Penncap- M 2F	1 ½-2 pt	6-8 pt	
	Spider mites	1. Vendex 50WP	1/4-½ lb	1-2 lb	Resistance developing. Begin watching for mites the end of June; reapply in 7-10 days if mite populations remain high; do not apply Vendex more than four times per season.
		2. Vendex 4L	4-8 fl oz	1-2 pts	
		3. Savey 50WP	See label	See label	An ovicide; target egg stage for control. When population is high, combine with an adulticide.
		4. Pyramite	3.3 oz	6.6-13.2 oz	
		5. Insecticidal soap (Safers, M-pede)	See label	See label	May require multiple applications.
		6. Summer-weight oil	See label	See label	May require multiple applications.
	San Jose scale	1. Diazinon 50WP	1 lb	4 lb	If scale is a serious problem, apply 2 sprays--one early to mid-June and one 14 days later or use pheromone traps to monitor males and apply first spray 600 - 700 degree-days after consistent catch (biofix).
		2. Penncap-M 2F	1-2 pt	4-8 pt	
		3. Lorsban 50WP	3/4 lb	3 lb	
	Powdery mildew	1. Bayleton 50WP	0.5-2 oz	2-8 oz	Powdery mildew control should continue until terminal growth ceases. These summer applications reduce overwintering mildew and incidence in the following year.
		2. Benlate 50WP	2-3 oz	8-12 oz	
		3. Benlate 50WP + summer oil	2 oz + 1 qt	½ lb + 1 gal	
		4. Rally 40SP	11/4-2 ½ oz	5-10 oz	
		5. Rubigan EC	2 1/4-3 oz	9-12 oz	
		6. Procure 50WS	2-4 oz	8-16 oz	
		7. Sulfur 51F	1 ½-3 pt	3-6 qt	Use sulfur every 7 - 8 days; avoid using when temperatures exceed 90°F.
		8. Sulfur 92WP	6-8 lb	24-32 lb	

(Apples)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Summer sprays	Aphids	1. Provado 1.6F 2. Thiodan 50WP 3. Diazinon 50WP 4. Dimethoate 4EC 5. Lorsban 50W 6. Insecticidal soap (Safers, M-pede)	2 fl oz 1 lb 1 lb 1/2-1 pt 3/4 lb See label	8 fl oz 4 lb 4 lb 2-4 pt 3 lb See label	Postbloom application only. 28-day pre-harvest interval. May require multiple applications.
	Apple maggot	1. Imidan 50WP (adjust pH to 6.5) 2. Guthion 50WP 3. Diazinon 50WP	1 ½ lb ½-3/4 lb 1 lb	6 lb 2-3 lb 4-5 lb	Apply within 10 days after first fly is caught; repeat applications at two-week intervals as additional flies are caught; if shipping through quarantine areas, sprays must be applied every two weeks from first catch to harvest.
	Western tentiform leafminer	1. Vydate 2L	½ pt	2 pt	Apply when mines average one per leaf during June or five per leaf in August; Vydate controls adults and sap feeders; toxic to predatory mites.
	Apple scab				See half-inch green stage for fungicides to be used for scab. Captan 50WP may be reduced to 1.5 lb/gal if scab is under control; otherwise, use 2 lbs. See apple scab fungicide properties to determine necessary residues; repeat applications at regular intervals.
	White apple leafhopper	1. Provado 1.6F 2. Thiodan 50WP 3. Diazinon 50WP 4. Carzol 92SP	1-2 fl oz 3/4 lb 1 lb 1/4 lb	4-8 fl oz 3 lb 4-6 lb 1 lb	Use this spray timing if a second generation is present in late summer; target 3rd-4th instar nymphs for better control. Toxic to predatory mites.
Pre-harvest	Codling moth	1. Sevin 4F	½ pt	1 qt	Use near harvest or on late-maturing varieties where pressure is high (1-day pre-harvest interval).
Post-harvest	Phytophthora collar rot	1. Fixed copper 2. Ridomil 25E	See label 3.5 ml/2-4 gal		Use as soil drench.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

APRICOT SPRAY GUIDE

(Apricots)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Calyx green - First white	Peach twig borer, Green peach aphid, European red mite, San Jose scale	1.Superior or Supreme oil + an organophosphate: Thiodan 3EC or Supracide 2EC	1 ½ gal 2/3 qt 1-2 pt	 2.67 qt 4-8 pt	Important spray for good peach twig borer control; do not skip.
	Peach twig borer (alone)	1. Bacillus thuringiensis (Biobit, Dipel, Javelin, MVP)		1 lb	Bt products are stomach poisons; good coverage is critical. If population pressure is high, may require 2-3 sprays, 5 - 7 days apart
	European red mite (alone)	1. Superior or Supreme oil	1 ½ gal		
Red calyx - First white	Coryneum blight	1. Fixed copper 2. Ziram 76WP 3. Bravo 500 40F 4. Bravo 720 54F	See label 2-2 ½ lb 1 ½ -2 qt 1-1 3/8 pt	See label 8-10 lb 4 ½ -6 pt 4-4 1/8 pt	Make a second application 2 weeks later, especially if rains occur. Do not apply copper after bloom.
First white - Petal fall	Lygus bug, stinkbug (catfacing insects)	1. Thiodan 50WP 2. Diazinon 50WP 3. Thiodan 3EC	1 lb 1 lb 2/3 qt	4 lb 4 lb 2.67 qt	Apply to the groundcover and orchard borders when insects are detected.
Green fruit	Coryneum blight	1. Ziram 76WP 2. Bravo 500 40F 3. Bravo 720 54F	2-2 ½ lb 1 ½ -2 qt 1-1 3/8 pt	8-10 lb 4 ½ -6 pt 4-4 1/8 pt	This timing is the most crucial for fruit protection.
Summer sprays	Oriental fruit moth	1. Imidan 70WP	3/4 - 11/4 lb	3 - 4 ½ lb	Use higher rate before mid-season. Optimal timing for control is 500-600 degree-days after consistent moth catch (biofix).

		(Apricots)			
Growth Stage	**Pest**	**Chemical**	**Rate Per 100 Gal***	**Rate Per Acre***	**Remarks**
	Peach twig borer	1. Thiodan 50WP 2. Imidan 70WP	1 lb 3/4-11/4 lb	4 lb 3-4 ½ lb	Use higher rate before mid-season. Application should be based on trap catches. First cover spray should be applied by 400 degree-days after consistent moth catch (biofix).
		3. Bacillus thuringiensis (Biobit, Dipel, Javelin, MVP)		1 lb	Bts are stomach poisons; good coverage is critical. Two to three applications are usually required.
Summer sprays	Peachtree (crown) borer	1. Thiodan 50WP 2. Thiodan 3EC	1-1 ½ lb 2/3-1 qt		Apply spray only to tree trunk and soil around trunk; use approximately ½ gallon spray per tree. Use traps to confirm adult activity; apply July 1-7; repeat August 1-7.
	Peach silver mite	1. Thiodan 50WP	1 lb	4 lb	Do not apply Thiodan more than 2 times/season.
Post-harvest	Peachtree borer	1. Ethylene dichloride 2. Paradichlorobenzene	See label See label	See label See label	These treatments are not required if summer applications were made. Treat Sept. 1 - 10.
	Coryneum blight	1. Fixed Copper 2. Bravo 500 40F 3. Bravo 720 54F	See label 1 ½ -2 pt 1-1 3/8 pt	See label 4 ½ -6 pt 4-4 1/8 pt	Apply after leaf fall in wet years only necessary in badly diseased orchards.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

CHERRY SPRAY GUIDE
(SWEET and TART)

(Cherries)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Spring	Phytophthora collar rot	1. Ridomil 2E	6 oz/1000 sq ft	2 gal	Apply to soil under trees; repeat at 2-3 month intervals; activated by rain or irrigation.
		2. Aliette (non-bearing only)	5 lbs	5 lbs	Foliar spray.
Side green - Green tip	European red mite, San Jose scale, Black cherry aphid, Leafrollers	1. Superior or Supreme oil +an organophosphate: Supracide 2EC or Lorsban 4E	1-1 ½ gal 1-2 pt ½ -1 pt	 4-6 pt 2-4 pt	EC formulations are recommended with oil. Lorsban is more effective than Supracide on leafrollers. Supracide is more effective than Lorsban on scale.
	European red mite (alone)	1. Superior or Supreme oil	1-1 ½ gal		
Tight cluster - Open cluster	Black cherry aphid, Thrips	1. Lorsban 50WP 2. Diazinon 50WP 3. Insecticidal soap (Safers, M-pede)	3/4 lb 1 lb See label	3 lb 4 lb See label	This application is an alternate to spraying at side green - green tip. Use Lorsban on tart cherries only; it will defoliate sweet cherries.
	Cutworms	1. Thiodan 50WP 2. Thiodan 3EC 3. Lorsban 50WP 4. Lorsban 4E 5. Bacillus thuringiensis (Biobit, Dipel, Javelin, MVP)	1 lb 2/3 qt ½ -1 lb ½ -1 pt ½ -1 lb		Apply to lower trunk and ground vegetation with a handgun. Use Lorsban on tart cherries only; it will defoliate sweet cherries.
	Cherry rust mite	1. Thiodan 50WP	1 lb	4 lb	
Petal fall	Fruittree leafroller	1. Thiodan 50WP 2. Bacillus thuringiensis	1 lb	4 lb 1 lb	Look for larvae feeding on and rolling leaves.
Shuck fall	Powdery mildew, rust mites	1. Sulfur 92WP 2. Sulfur 50.7F	5-10 lb 1-1 ½ pt	20-40 lb 1-2 gal	Watch for possible increase in spider mite populations with sulfur use.

Continued

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
		(Cherries)			
Shuck fall	Powdery mildew (alone)	1. Benlate 50WP 2. Sulfur 92WP 3. Rubigan 1EC 4. Rally 5. Elite 45DF 6. Topsin M 70W	6-8 oz 5-10 lb 3-6 oz 1 ½ -2 oz 2 oz 6-8 oz	1.5-2 lb 20-40 lb 6-12 oz 6-8 oz 4-8 oz 1.5 lb	The first application should be made as soon as minute spots of mildew are barely visible on the back of leaves. Check with county agent for precise timing. Do not apply Rally within 7 days of harvest; do not apply sulfur when temperature exceeds 95°F.
7 - 14 days after shuck fall	Powdery mildew, rust mite	1. Same as shuck fall			
	Black cherry aphid	1. Diazinon 50WP 2. Malathion 25WP 3. Insecticidal soap (Safers, M-pede)	1 lb 2 lb See label	4 lb 8 lb See label	May aggravate existing mite populations.
2-4 weeks after bloom	Sour cherry yellows virus	1. Gibberellic acid 2. Gibberellic acid	10 - 25 ppm 50 - 100 ppm	See label See label	Mature trees: spray to increase the number of spurs; may take two years to see results. Young trees: to initiate flower drop and prevent infection from pollen-borne virus.
Late spring and summer sprays	Cherry rust mite	1. Thiodan 50WP 2. Wettable sulfur 3. Vendex 50WP 4. Vendex 4L	½ lb 2 ½ -3 lb 1/4-½ lb 1/4-½ pt	2 lb 10-12 lb 1-2 lb 1-2 pt	Do not apply Thiodan more than 2 times/season. Watch for plant injury with sulfur.
	Spider mites	1. Vendex 50WP 2. Vendex 4L	1/4 -1/2 lb 4-8 oz	1-2 lb 1-2 pt	
Summer sprays	Western cherry fruit fly, Apple maggot	1. Guthion 50WP 2. Lorsban 50WP 3. Diazinon 50WP	½ lb 3/4 lb ½ -1 lb	1 ½ lb 3 lb 2-4 lb	Begin treatment within 7-10 days of first fly catch; repeat at 7-14 day intervals as many times as necessary. Use Lorsban on tart cherries only. Pre-harvest intervals: Lorsban, 14 days; Guthion, 15 days; Diazinon, 21 days.
	Phytophthora collar rot	1. Fixed copper 2. Aliette	See label 5 lb	 5 lb	 Use Aliette on non-bearing trees only.
	Cherry slug (sawfly)	1. Diazinon 50WP 2. Guthion 50WP	1 lb ½ lb	4 lb 1 ½ lb	Rarely an economic problem. Usually controlled with fruit fly sprays.

			(Cherries)		
Growth Stage	**Pest**	**Chemical**	**Rate Per 100 Gal***	**Rate Per Acre***	**Remarks**
Post-harvest	Spider mites	1. Vendex 50WP 2. Vendex 4L	1/4 -1.28 lb 4-8 oz	1-2 lb 1-2 pt	Mites must be controlled to prevent yield losses the following year. No more than 2 Vendex applications/season.
	Aphids	1. Thiodan 50WP 2. Diazinon 50WP 3. Insecticidal soap (Safers, M-pede)	½ lb 1 lb See label	2 lb 4 lb See label	Only control aphids post-harvest if infestation is severe.
	Shothole borer	1. Thiodan 50WP	1 lb	4 lb	Borers usually indicate trees are under stress.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

PEACH AND NECTARINE SPRAY GUIDE

			(Peaches and Nectarines)		
Growth Stage	**Pest**	**Chemical**	**Rate Per 100 Gal***	**Rate Per Acre***	**Remarks**
Calyx green - First pink	Peach twig borer, Green peach aphid, European red mite, San Jose scale	1. Superior or Supreme oil + one of the following: Thiodan 3EC or Supracide 2EC	1 ½ gal 2/3 qt 1 - 2 pt	 2.67 qt 4 - 8 pt	Important spray for good peach twig borer control; do not skip.
	Peach twig borer (alone)	1. Bacillus thuringiensis (Biobit, Dipel, Javelin, MVP)		1 lb	Bt products are stomach poisons; good coverage is critical. If population pressure is high, may require 2-3 sprays, 5-7 days apart.
	European red mite (alone)	1. Superior or Supreme oil	1 ½ gal		
	Climbing cutworms	1. Thiodan 3EC 2. Thiodan 50WP 3. Bacillus thuringiensis (Biobit, Dipel, Javelin, MVP)	1 pt 1 lb ½ -1 lb		Apply thoroughly to lower trunk and ground cover.

(Peaches and Nectarines)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
First pink - Petal fall	Lygus bug, stink bug (catfacing insects)	1. Thiodan 50WP 2. Thiodan 3EC 3. Diazinon 50WP 4. Carzol 92SP	1 lb 2/3 qt 1 lb 1/4 lb	4 lb 2.67 qt 4 lb 1 lb	Apply to the ground cover and orchard borders when insects are detected. Carzol applications during bloom must be made at night because of toxicity to bees.
	Green peach aphid	1. Thiodan 50WP 2. Diazinon 50WP	1 lb 1 lb	4 lb 4 lb	Thiodan: no more than two applications during fruiting period.
	Powdery mildew (rusty spot on fruit)	1. Benlate 50WP 2. Sulfur 92WP	8 oz See label	2 lb See label	Do not use sulfur when temperatures exceed 90°F.
	Powdery mildew (on foliage and fruit)	1. Funginex 1.6EC 2. Rally 40WP 3. Sulfur 92WP	9-12 oz ½ - 1 ½ oz See label	36-48 oz 2 ½-6 oz See label	
	Western flower thrips	1. Carzol 92SP	1/4 lb	1 lb	Primarily a problem on nectarines. Carzol applications during bloom must be made at night because of toxicity to bees.
Shuck split	Coryneum blight	1. Bravo 500 40F 2. Bravo 720 54F 3. Ziram 76WP	11/4-1 ½ pt 1-1 3/8 pt 2 lb	4 ½ -6 pt 3 1/5-4 1/5 pt 8-10 lb	
Shuck fall	Oriental fruit moth	1. Guthion 50WP 2. Imidan 70WP	1/4 - ½ lb 1 lb	1-2 lb 4 lb	Application is best timed with traps. Optimal timing for control is 500 - 600 degree days after consistent moth catch (biofix).
	Coryneum blight	1. Bravo 720 54F 2. Captan 50WP 3. Ziram 76WP	1-1 3/8 pt 2-4 lb 2 lb	3 1/8-4 1/8 pt 10 lb 8 lb	Repeat if rains persist. This application is advised only if weather is wet and inoculum is high from spring.
	European red mite	1. Vendex 50WP 2. Vendex 4L 3. Omite 30WP	4-8 oz 4-8 fl oz 11/4 lb	1-2 lb 1-2 pt 5 lb	Check for live ERM from petal fall to shuck fall; apply if needed. Omite for use on nectarines only.
Summer sprays	Peach twig borer	1. Thiodan 50WP 2. Guthion 50WP 3. Imidan 70WP	1 lb ½ -5/8 lb 1 lb	4 lb 1 3/4-2 1/4 lb 4 lb	Application should be based on trap catches. First cover spray should be applied by 400 degree days after consistent moth catch (biofix).

(Peaches and Nectarines)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
	Peachtree crown borer	1. Lorsban 4E 2. Thiodan 50WP 3. Thiodan 3EC	3 qt 1-1 ½ lb 1 qt		Apply sprays only to tree trunk and soil around trunk. Lorsban should only be applied once. Use approximately ½ gal of spray per tree. Use pheromone traps to assist with proper timing; spray when adult moths become active. First treatment should be July 1 - 7 and a second one (Thiodan only) August 1 - 7. Avoid contaminating the fruit.
Summer sprays	Peach silver mite	1. Wettable sulfur 2. Thiodan 50WP 3. Omite 30WP	2 ½ -3 lb 1 lb 11/4 lb	10-12 lb 4 lb 5 lb	Watch for plant injury with sulfur. Omite for use on nectarines only. Do not apply Thiodan and Omite more than two times/season.
	Spider mites	1. Vendex 50WP 2. Vendex 4L 3. Insecticidal soap (Safers, H-pede) 4. Omite 30WP	4-8 oz 4-8 fl oz See label 1 lb	1-2 lb 1-2 pt See label 4 lb	Use lower rates if predators are present. Reapply in 7-10 days if mite populations remain high. Omite for use on nectarines only.
	Oriental fruit moth	1. Guthion 50WP 2. Imidan 70WP	½ lb 1 lb	2 lb 4 lb	First application is best timed with earlier trap catches and computer model. Second application should follow in ca. 21 days.
Pre-harvest	Coryneum blight	1. Ziram 76WP 2. Captan 50WP	2 lb 2-4 lb	8 lb 10 lb	Only necessary when rain is frequent. Wash or brush off Ziram residues. Do not wax Captan-treated fruit.
Post-harvest	Coryneum blight	1. Bordeaux mixture 2. fixed coppers 3. Ziram 76WP 4. Bravo 500 40F 5. Bravo 720 54F 6. Captan 50WP	10-10-100 See label 2 lb 1 ½ -2 pt 1-1 3/8 pt 2-4 lb	10-10-100 See label 8 lb 4 ½ -6 pt 3 1/8-4 1/8 pt 10 lb	Apply immediately after leaf fall on severely infected trees, especially in wet fall weather. Fixed coppers are more effective when combined with 1 - 2 gallons of dormant oil per acre.
	Peach silver mite	1. Wettable sulfur 2. Omite 30WP	2 ½ -3 lb 11/4 lb	10-12 lb 5 lb	Only if silver mite problem is severe or persists. Omite for use on nectarines only.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

PEAR SPRAY GUIDE

(Pears)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Dormant	Pear psylla	1. Superior or Supreme oil + Asana 0.66EC or Pounce 3.2EC or Ambush 2EC or Thiodan 3EC	1-1 ½ gal 4 fl oz 3 fl oz 5 fl oz 3/4 qt	 1 pt 12 fl oz 20 fl oz 3 qt	Dormant is preferred spray timing over delayed dormant. Apply at the onset of egg laying (about six weeks before bloom). Do not use Asana, Pounce, or Ambush more than two times/season.
Tight cluster - First white	Fire blight in orchards with a history of blight	1. Bordeaux 8-8-100 + 1% dormant oil 2. Kocide	8-8-100 + 1 gal See label	 See label	Used to reduce overwintering inoculum. Any fixed copper plus 1% dormant oil can be used. See apple at silver tip for examples.
	Pear psylla	1. Morestan 25WP 2. Superior or Supreme oil + Asana 0.66EC or Pounce 3.2EC or Ambush 2EC or Thiodan 3EC	11/4 lb 1 ½ gal 4 fl oz 2-4 fl oz 5 fl oz 3/4 qt	5 lb 1 pt 8-12 fl oz 20 fl oz 3 qt	Use only if dormant spray was missed or if a severe problem is expected! Do not use Morestan on Asian or Seckel pears. Do not apply oil 10 days before or after Morestan.
	Pear rust mite, pear leaf blister mite	1. Morestan 25WP 2. Superior or Supreme oil + Thiodan 3EC or Sevin 4F	1 lb 1-1 ½ gal 3/4 qt 1 pt	4 lb 3 qt 4 pt	Do not use Morestan on Asian or Seckel pears. Oil may be omitted if previously applied as a dormant spray. Do not apply oil 10 days before or after Morestan.
	European red mite, San Jose scale	1. Superior or Supreme oil + Supracide 2EC	1 ½ gal 1-2 pt	 4-6 pt	If oil was applied during dormant stage, do not apply more than 4 gallons/acre. Do not apply oil after tight cluster.
	European red mite (alone)	1. Superior or Supreme oil	1 ½ gal		
Tight cluster - First bloom	Cutworms, leafrollers, Lygus bug, Stink bug				See Pest Control Program for Apples. Check labels for use on pears.
Bloom	Fire blight during bloom	1. Streptomycin 17% 2. Terramycin 17% 3. Fixed coppers (tribasic copper sulfate, Zinc coposil, or copper hydroxide)	8 oz 16 oz See label	32 oz See label	Check with county agent for high risk days, otherwise, begin applications when daily mean temperature exceeds 60°F. Repeat every 3 - 5 days during bloom if weather remains warm and rain occurs. Spray within 24 hours after hail storms. Fixed coppers may cause russetting of fruit.

(Pears)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Petal Fall	Pear psylla	1. Agri-Mek 0.15EC+ horticultural mineral oil	4-5 fl oz 1 qt	16-20 fl oz 1 gal	Apply with 0.25% oil. Two applications maximum / season.
Summer sprays	Codling moth, leafrollers	1. Guthion 50WP 2. Imidan 70WP 3. Diazinon 50WP 4. Penncap- M 2F	½ -3/4 lb 3/4-11/4 lb 1 lb 1 ½ -2 pt	2-3 lb 3-4 ½ lb 4-5 lb 6-8 pt	First application for codling moth should occur 250 degree days after the first date of continuous moth catch (biofix) in pheromone traps. Apply second spray based on spray protection interval and codling moth pressure. Penncap-M is highly toxic to bees; mow ground cover before application.
	Spider mites and European red mite	1. Apollo 50SC 2. Savey 50WP 3. Vendex 50WP 4. Vendex 4L 5. Agri-Mek 0.15E+ horticultural mineral oil 6. Pyramite	1-2 fl oz 1-1 ½ oz 6-8 oz 6-8 fl oz 2 ½ -5 fl oz 1 qt 3.3 oz	4-8 fl oz 4-6 oz 1 ½ -3 lb 1 ½ -3 pt 10-20 fl oz 1 gal 6.6 - 13.2 oz	Apollo and Savey are ovicides; must be applied early when mite population is primarily in egg stage. When initial mite populations are high, use ovicide in combination with an adulticide. Use lower rates if predators are present. Apply Agri-Mek with 0.25% paraffinic summer oil. Two applications maximum/season.
	Pear psylla	1. Mitac 50WP 2. Thiodan 50WP 3. Agri-Mek 0.15E+ horticultural mineral oil 4. Provado 1.6F 5. Pyramite	3/4 lb 3/4-1 lb 5 oz 1 qt 4-5 oz 3.3 oz	3 lb 3-4 lb 11/4 pt 1 gal 16-20 oz 6.6 - 13.2 oz	Apply Agri-Mek with 0.25% oil. Two applications maximum/season. Provado: efficacy may be increased by adding 0.25% horticultural oil.
	Pear rust mite	1. Vendex 50WP 2. Vendex 4L 3. Carzol 92SP 4. Kelthane 50WP 5. Pyramite	6-8 oz 6-8 fl oz 4-8 oz 1 lb 2.2 oz	1 ½ -3 lb 1 ½ -3 pt 1 -2 lb 4 lb 4.4 - 6.6 oz	Do not apply more than 4 lbs Carzol per acre per season. Use lower rates if predators are present. Carzol is toxic to predatory mites.
	Pear slug (sawfly)	1. Diazinon 50WP 2. Guthion 50WP	1 lb ½ lb	4 lb 1 ½ lb	Rarely an economic problem. Usually controlled with codling moth sprays.
Post-harvest	Blister mite, rust mite	1. Thiodan 50WP 2. Lime-sulfur + Superior or Supreme oil 3. Sevin 50WP 4. Sevin 4F	3/4 lb Follow label directions 3/4 gal 1 - 1 ½ lb 1 - ½ lb	3 lb 3 gal 4 - 6 lb 4 - 6 pt	Where problem is severe. Use caution with lime-sulfur to avoid plant injury.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

PLUM AND PRUNE SPRAY GUIDE

(Plums and Prunes)

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Green tip- Tight cluster	Scales, aphids, mites, peach twig borer	1. Superior or Supreme oil + an organophosphate insecticide registered for these pests	1 gal		Liquid or EC formulations are preferred for use with oil. See Peach and Nectarine Spray Guide.
	Fruittree leafroller	1. Guthion 50WP 2. Thiodan 50WP	½ -3/4 lb 3/4-1 lb	2-4 lb 3-4 lb	
Post-bloom	Aphids	1. Diazinon 50WP 2. Thiodan 50WP 3. Insecticidal soap (Safers, M-Pede)	1 lb 1 lb See label	4 lb 4 lb See label	Apply as needed during spring and summer.
	Peach twig borer	1. Imidan 70WP 2. Thiodan 50WP 3. Guthion 50WP	1 lb 3/4-1 lb 3/4-1 lb	4 lb 3-4 lb 3-4 lb	Applications should be timed with moth flights determined by pheromone traps; otherwise, make applications when fruit is 3/4 inch long, around the later part of June.
	Scale insects	1. Diazinon 50WP	1 lb	4 lb	Summer sprays are directed toward crawlers which appear in late June.
	Earwigs	1. Sevin 50WP	½ -1 lb	2-4 lb	Watch for mite outbreaks with the use of Sevin.
	Spider mites	1. Vendex 50WP 2. Vendex 4L	4-8 oz 4-8 fl oz	1-2 lb 1-2 pt	
	Peachtree borer				See instructions for peach trees. Lorsban is not cleared for Plums and Prunes.

***Note about rates:** Application rates given are for dilute sprays, generally 400 gallons per acre. Gallonage requirements will vary depending on tree size, density, and spray equipment. Concentrate applications should base rates on the amount per acre rather than the amount per 100 gallons.

WALNUT SPRAY GUIDE

Growth Stage	Pest	Chemical	Rate Per 100 Gal*	Rate Per Acre*	Remarks
Post-bloom (Apply when necessary)	Aphids	1. Diazinon 50WP 2. Malathion 25WP 3. Thiodan 50WP	½ lb 1-1 ½ lb 1 lb	2 lb 4-6 lb 4 lb	Do not apply after husks open.
	Walnut husk fly	1. Malathion 25WP 2. Guthion 50WP 3. Lorsban 50WP	1-1 ½ lb 3/4-1 lb 1 lb	4-6 lb 3-4 lb 4 lb	Best timed with traps or about August 1 and 15. Apply first treatment within 10 days after catch of adults on yellow sticky traps.

HERBICIDES REGISTERED (X) FOR THE VARIOUS FRUIT CROPS

	Apple		Apricot		Sweet Cherry		Tart Cherry		Peach		Pear		Plum		Grape	
Herbicide	**B**	**NB**	**B**	**NB**	**B**	**NB**	**B**	**NB**	**B**	**NB**	**B**	**NB**	**B**	**NB**	**B**	**NB**
Basamid		X		X		X		X		X		X		X		
Casoron	X	X			X	X	X	X							X	X
Devrinol	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diquat																X
2, 4-D amine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fusilade		X	X	X	X	X	X	X	X	X		X	X	X		X
Gallery		X		X		X		X		X		X		X		X
Goal	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Gramoxone	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Karmex (0.M > 1%)	X	X							X	X	X	X			X	X
Kerb	X	X			X	X	X	X	X	X	X	X	X	X	X	X
MSMA		X		X		X		X		X		X		X		X
Poast	X	X		X		X		X		X	X	X		X	X	X
Princep	X	X					X	X			X	X			X	X
Prism		X		X		X		X		X		X		X		X
Prowl		X		X		X		X		X		X		X		X
Rely	X	X													X	X
Roundup	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sinbar	X	X							X	X						
Snapshot		X				X				X		X		X		X
Solicam	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Surflan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Touchdown		X		X		X		X		X		X		X		X
Treflan			X	X					X	X			X	X	X	X

B = Bearing trees; NB = Nonbearing trees

SUMMARY OF WEEDS CONTROLLED BY

HERBICIDES REGISTERED FOR FRUIT TREES

	Grasses		Broadleaf	
Herbicide Type	**Perennial**	**Annual**	**Perennial**	**Annual**
Pre-emergence	Kerb(31)	Kerb (31) Devrinol (28) Surflan (29) Prowl (30) Treflan (32) Karmex (27) Princep (31) Sinbar (31) Solicam (29) Casoron (27) Goal (29) Snapshot (29)	2, 4-D amine	Devrinol (28) Surflan (29) 2, 4-D amine Prowl (30) Treflan (32) Karmex (27) Princep (31) Sinbar (31) Solicam (29) Casoron (27) Goal (29) Gallery (28) Snapshot (29)
Post-emergence	Roundup (28) Fusilade (27) Poast (31)	Roundup (28) Gramoxone (30) Fusilade (27) Diquat Poast (31)	Roundup (28)	Roundup (28) Gramoxone (30) Diquat

Numbers within ( ) are page numbers in the 1994-95 Montana-Utah-Wyoming Commercial Horticulture Weed Control Handbook.