



Pesticide Uses and Risks Factsheet & Crop Production Calendars for the Bear Creek Basin

Middle Rogue Pesticide Stewardship Partnership

This pesticide-use and risk factsheet and associated crop production calendars were developed to aid the Middle Rogue Pesticide Stewardship Partnership (PSP) and general public in understanding some of the possible applicator groups of pesticides monitored for in tributaries of Bear Creek. The crop calendars provide the general timings of agricultural production activities and pest management treatments for selected crops in the Bear Creek watershed. **When selecting and applying pesticides always read and carefully follow the label directions.**

Determining the user groups of chemicals detected in surface water is important for targeting educational activities and development of best management practices to reduce contamination. Attempting to attribute pesticide detections in Bear Creek tributaries is complicated by the diverse matrix of land uses in the watershed. Important agricultural land uses include horticultural, field crops, and pasture. Forestry, rights of way, non-crop areas, residential uses, and application to aquatic systems (irrigation canals and control of aquatic and riparian weeds) are important uses of pesticides in the watershed. Many of the land uses occur side-by-side on the landscape, and many pesticides may be used on several different crops or sites. For example, based on tables below, detections of glyphosate could be attributed to numerous pesticide user groups, while detections of EPTC would likely be associated with applications to alfalfa. Careful understanding and targeted

monitoring is often required to positively attribute materials detected to any one land use group.

The 2017 USDA Census of Agriculture found that approximately 3,800 acres of pears, 2,800 acres of wine grapes, 14,700 acres of grass hay, 3,500 acres of alfalfa hay, and 300 acres of small grain were harvested in Jackson County in that year. Since 2017, acreage of hemp grown in the county has increased dramatically. None of the pesticides allow for use on hemp are monitored by the PSP, but farmers growing hemp may treat non-crop areas or other use sites with chemicals monitored for by the PSP.

The tables on the following pages detail the use sites and environmental risks for 57 chemicals currently monitored for by the PSP. These chemicals are currently labeled for use in Oregon and on crops/sites common in the Bear Creek watershed. An additional 72 chemicals are monitored for by the PSP, but these are either legacy pesticides not currently labeled for use or are materials with use on crops/sites uncommon in the Bear Creek watershed (e.g. corn or potatoes).

Further information on the use sites for various pesticide chemicals in Oregon can be obtained from the product label and the Washington State University Pesticide Information Center Online:

<http://cru66.cahe.wsu.edu/labels/Labels.php>

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Oregon State University
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Table 1: Herbicides	Example Trade Name	Detection Frequency 2014-2018	Max. Aquatic Life Ratio 2014-2018 ¹	Aquatic Risk										
				Pears ²	Grapes	Alfalfa Hay	Grass Hay	Wheat/Barley	Non-Crop ³	Home Uses ⁴	Forestry ⁵	Aquatic Sites	Surface Water Risk ⁶	Groundwater Risk ⁷
diuron	Karmex	51%	0.33	●	●	●	●	●	●	●			●	●
glyphosate	RoundUp	36%	0.00	●	●	●	●	●	●	●	●	●	●	●
sulfometron-methyl	Oust	18%	0.18						●		●		●	●
oxyfluorfen	Goal	9%	1.27	●	●				●	●	●		■	●
2,4-D	Barrage	8%	0.00	●			●	●	●	●	●	●	■	■
imazapyr	Arsenal	7%	0.02						●		●	●	●	●
metsulfuron methyl	Opensight	5%	0.16				●	●	●		●		●	●
dichlobenil	Casoron	2%	0.00	●	●				●	●			●	■
atrazine*	Aatrex	2%	0.09						●		●		■	■
prometon	Pramitol	2%	0.00						●				■	●
bromacil	Hyvar	1%	0.01						●				●	■
triclopyr (ester)	Garlon 4	1%	0.01				●		●	●	●		■	■
triclopyr (amine)	Garlon 3A	1%	0.01				●		●	●	●	●	●	■
simazine	Princep	1%	0.02	●					●		●		■	■
fluridone	Sonar	<1%	0.00						●			●	●	●
tebuthiuron	Spike	<1%	0.00					●	●				●	■
hexazinone	Velpar	<1%	0.01			●			●		●		●	■
norflurazon	Solicam	<1%	0.00	●	●	●			●				●	■
pendamethalin	Prowl	1%	0.01	●	●	●		●		●			■	●
dacthal	dacthal	ND	ND						●		●		■	■
EPTC	Eptam	ND	ND			●							●	●
fenoprop	Acclaim	ND	ND					●	●	●	●		■	●
linuron	Lorox	ND	ND					●	●				■	■
MCPA	Orion	ND	ND			●	●	●	●	●	●		■	■
MCPP	Mecomec	ND	ND							●			■	■
metribuzin	Sencor	ND	ND			●	●	●					●	●
napropamide	Devrinol	ND	ND		●				●		●		●	●
picloram*	Graslan	ND	ND				●	●	●		●		●	■
pronamide	Barricade	ND	ND		● NB				●	●	●		●	●
pyraflufen-ethyl	Venue	ND	ND				●	●	●		●		■	●
siduron	Tupersan	ND	ND						●	●			■	●
terbacil	Sinbar	ND	ND	● NB		●							●	●
trifluralin	Treflan	ND	ND	●	●	●		●	●	●	●		■	●

Table 2: Insecticides	Example Trade Name	Detection Frequency 2014-2018	Max. Aquatic Life Ratio 2014-2018 ¹	Pears ²	Grapes	Alfalfa Hay	Grass Hay	Wheat/Barley	Non-Crop ³	Home Uses ⁴	Forestry ⁵	Aquatic Sites	Surface Water Risk ⁶	Groundwater Risk ⁷
imidacloprid	Admire	6%	17.70	●	●			●		●			■	■
acetamiprid	Assail	4%	0.32	●	●	●	●	●	●	●			■	■
carbaryl	Sevin	<1%	0.02	●	●	●	●	●	●	●	●		■	●
chlorpyrifos*	Lorsban	<1%	0.85	●	●	●		●	●		●		■	●
diazinon*	Diazinon	<1%	3.24	●							●		■	●
acephate	acephate	ND	ND	● NB					●	●	●		■	●
bifenthrin*	Sniper	ND	ND	●	●		●			●	●		■	■
dimethoate	dimethoate	ND	ND	●			●	●			●		■	■
esfenvalerate*	Asana	ND	ND	●						●			■	●
ethoprop*	Mocap	ND	ND								●		■	●
fenvalerate	Onslaught	ND	ND						●	●			■	●
malathion	Fyanon	ND	ND	●	●	●	●	●	●	●	●		■	●
methiocarb*	Mesurool	ND	ND	● NB	● NB					●			■	●
methomyl*	Lannate	ND	ND		●	●	●	●					■	■
oxamyl*	Vydate	ND	ND	●									■	■
permethrin	many	ND	ND	●	●	●			●	●	●		■	●
pyriproxyfen	Esteem	ND	ND	●	●	●		●	●	●	●		■	●

Table 3: Fungicides	Example Trade Name	Detection Frequency 2014-2018	Max. Aquatic Life Ratio 2014-2018 ¹	Pears ²	Grapes	Alfalfa Hay	Grass Hay	Wheat/Barley	Non-Crop ³	Home Uses ⁴	Forestry ⁵	Aquatic Sites	Surface Water Risk ⁶	Groundwater Risk ⁷
propiconazole	Tilt	< 1%	0.00	● NB			●	●		●			■	●
azoxystrobin	Abound	ND	ND		●	●	●	●			●		■	■
chlorothalonil	Bravo	ND	ND						●	●	●		■	■
etridiazole	Truban	ND	ND								●		■	●
pyraclostrobin	Cabrio	ND	ND	●	●	●	●	●		●	●		■	■
triadimefon	Bayleton	ND	ND	● NB							●		■	■
trifloxystrobin	Flint	ND	ND	●	●	●	●	●			●		■	■

* Restricted use pesticide

ND Not detected in Middle Rogue PSP sampling between 2014 and 2018

NB For use on non-bearing trees or vines

¹This is the ratio of the concentration detected divided by the lowest EPA Aquatic Life Benchmark

²Use sites extracted from the Washington State University Pesticide Information Center Online (PICOL) labels for Oregon

³Use sites including non-crop areas, roadsides, and rights-of-way

⁴Use sites including forestry, forest release, and conifers

⁵Marked as intended for home use in PICOL

⁶Labels include a surface water advisory or environmental hazard statement indicating toxicity to aquatic organisms

⁷Labels include a groundwater advisory statement related to movement or persistence in groundwater

Middle Rogue Pesticide Stewardship Partnership Crop Calendar – Pears

Timing	J	F	M	A	M	J	J	A	S	O	N	D
		Dormancy	Bud swell	First bloom	Full Bloom	Small fruit	Fruit growth	Fruit growth	Fruit maturity & Harvest	Fruit maturity & Harvest	Leaf drop	Dormancy
Insects	Psylla, Scale & Mites	Psylla, Scale & Mites	Psylla	Psylla	Codling Moth, Psylla & Mites	Codling Moth, Psylla & Mites	Codling Moth, Psylla & Mites	Codling Moth, Psylla & Mites	Psylla	Psylla		
Diseases		Scab & Powdery Mildew	Fireblight	Fireblight	Scab, Fireblight & Powdery Mildew			Post-harvest Rots	Post-harvest Rots			
Weeds	Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials		Summer Annuals & Perennials	Summer Annuals & Perennials	Summer Annuals & Perennials			Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials
Movement Risks	Thermal Drift											
	Wind Drift											
	Inversion Drift											
	Runoff											

Darker color indicates increased risk.

Management

Insect Pest Management

Significant insect pests of pear in southern Oregon include codling moth, pear psylla, mites, true bugs, and scales. A range of oil, sulfur, targeted, and broad-spectrum insecticides are used for control of psylla, mites, and scale insects. Codling moth are controlled with pheromone-based mating disruption, use of an insecticidal virus and, targeted insecticides. Insecticides used for pest control in orchards and tested for in surface water by the Middle Rogue PSP include: imidacloprid, acetamiprid, permethrin, bifenthrin, pyriproxyfen, chlorpyrifos, and diazinon.

Disease Management

The main pathogens of pears in Jackson County are fireblight, scab, and powdery mildew. Fireblight is managed with copper and antibiotics in the early season and cutting infected wood during the rest of the growing season. Powdery mildew is controlled during early season with the use of sulfur, oils, and a range of fungicides. Scab is controlled with cultural practices to maximize airflow through trees and with fungicides. Rotation among fungicide chemistries is important to limit resistance. Pyraclostrobin and trifloxystrobin are fungicides labeled for pears currently tested for by the Middle Rogue PSP.

Weed Management

Weeds are controlled in orchard driverows primarily through mowing. Undertree weed control primarily relies on herbicide application. Dichlobenil, diuron, norflurazon, oxyfluorfen, pendimethalin, simazine, and trifluralin are used for pre-emergent weed control and are generally applied October to March. Glyphosate and 2,4-d amine are used for post-emergent weed control during the growing season. All herbicides listed above are tested for in surface waters by the Middle Rogue PSP.

A complete list of pesticides labeled for use in pears in Oregon is available at pnwhandbooks.org
Always read and follow the label when applying pesticides.

Assembled by Gordon Jones, Southern Oregon Research & Extension Center, for the Middle Rogue Pesticide Stewardship Partnership
 Sources: Mitcham, E. and R. Elkins. 2007. Pear Production and Handling Manual. University of California Agriculture and Natural Resources.
 Jepson, P. 2017. Middle Rogue pesticide movement risk evaluation.
 Murray, M. and J. DeFrancesco. 2014. Pest Management Strategic Plan for Pears in Washington and Oregon. Integrated Plant Protection Center.
 Thompson, A. et al. 2019. EM 8203: 2019 Pest Management Guide for Tree Fruits in the Mid-Columbia Area. Oregon State Extension Service.



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Middle Rogue Pesticide Stewardship Partnership Crop Calendar - Wine Grapes

Timing	J	F	M	A	M	J	J	A	S	O	N	D
	Dormancy	Dormancy	Delayed Dormant	Shoot Growth	Bloom	Fruit Set	Fruit Growth	Verasion	Pre-Harvest	Harvest	Dormancy	Dormancy
Pests	Insects			Mites	Mites, Hoppers, & Mealybugs	Mites & Hoppers	Mites & Hoppers	Mites, Hoppers & Mealybugs	Hoppers			
	Diseases			Powdery Mildew	Powdery Mildew & Botrytis	Powdery Mildew	Powdery Mildew	Botrytis	Botrytis			
	Weeds	Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials		Summer Annuals & Perennials	Summer Annuals & Perennials	Summer Annuals & Perennials			Winter Annuals & Perennials	Winter Annuals & Perennials
Movement Risks	Thermal Drift											
	Wind Drift											
	Inversion Drift											
	Runoff <small>Darker color indicates increased risk</small>											

Management

Insect Pest Management

Insect pest problems in vineyards occur occasionally in Southern Oregon. Many crops are grown without insecticide application. Grape mealybug can vector Grapevine Leafroll-associated Virus, and three-cornered alfalfa hoppers are thought to vector Grapevine Red Blotch Virus. These pests are controlled with cultural practices and insecticide application, often applied through drip irrigation systems. Spider mites and erineum mites are occasionally treated with miticide application. Acetamiprid and imidacloprid are used for control leaf and tree hoppers in vineyards and are tested for in surface water by the Middle Rogue PSP.

Disease Management

The main fungal pathogens of wine grapes in Jackson County are powdery mildew and Botrytis bunch rot. Powdery mildew is controlled throughout the growing season with the use of oil, sulfur, and a range of fungicides. Botrytis is controlled with cultural practices to maximize airflow through vines and clusters and with the use of fungicides from bloom to pre-harvest. Rotation among fungicide chemistries is important to limit resistance. Azoxystrobin, pyraclostrobin, and trifloxystrobin fungicides labeled for wine grapes currently evaluated by the Middle Rogue PSP.

Weed Management

Weeds are controlled in vineyard driverrows primarily through mowing. Undervine weed control has primarily relied on herbicide application, but increasingly vineyard managers are using undervine mowing and cultivation. Dichlobenil, diuron, napropamide, norflurazon, pendimethalin, pronamide, simazine, trifluralin may be used for pre-emergent weed control and applied November to March. Glyphosate is commonly used for post-emergent weed control during the growing season. All herbicides listed above are tested for in surface waters by the Middle Rogue PSP.

A complete list of pesticides labeled for use in wine grapes in Oregon is available at pnwhandbooks.org
Always read and follow the label when applying pesticides.

Assembled by Gordon Jones, Southern Oregon Research & Extension Center, for the Middle Rogue Pesticide Stewardship Partnership
 Sources: Hellman, E. 2003. Oregon Viticulture. Oregon State University Press.
 Jepson, P. 2017. Middle Rogue pesticide movement risk evaluation.
 Murray, M. and J. DeFrancesco. 2016. Pest Management Strategic Plan for Winegrapes in Oregon. Integrated Plant Protection Center,
 Skinkis, P. et al. 2019. EM 8413: 2019 Pest Management Guide for Wine Grapes in Oregon. Oregon State University Extension Service.



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Middle Rogue Pesticide Stewardship Partnership Crop Calendar - Alfalfa Hay

Timing	J	F	M	A	M	J	J	A	S	O	N	D
	Dormancy	Green Up	Growing	Growing	1 st Cutting	Regrowth	2 nd Cutting	Regrowth	3 rd Cutting	Regrowth	Regrowth	Dormancy
Pests	Insects			Alfalfa Weevils	Alfalfa Weevils	Alfalfa Weevils						
	Diseases				Downy Mildew	Downy Mildew	Downy Mildew	Downy Mildew				
	Weeds	Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials		Summer Annuals & Perennials	Summer Annuals & Perennials		Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials
Movement Risks	Thermal Drift											
	Wind Drift											
	Inversion Drift											
	Runoff <small>Darker color indicates increased risk</small>											

Insect Pest Management
 The most economically important pest of alfalfa is the alfalfa weevil, which can reduce the yield and quality of alfalfa by skeletonizing leaves. Alfalfa weevil damage is limited by early harvest and the application of insecticides. Carbaryl, malathion, chlorpyrifos, dimethoate, and permethrin are labeled for the control of alfalfa weevil and are monitored for by the Middle Rogue PSP.

Disease Management
 Control of diseases in alfalfa is obtained by planting resistant varieties and the use of fungicides, primarily as seed treatment but also rare foliar applications. Of the fungicides labeled for alfalfa and monitored by the Middle Rogue PSP, pyraclostrobin and azoxystrobin are used as both seed treatments and foliar sprays, while trifloxystrobin is only labeled as a seed treatment on alfalfa.

Weed Management
 Weed control in alfalfa is primarily achieved with the production of vigorous stands and proper fertilization, irrigation and harvest management. Herbicides labeled for alfalfa and tested for by the Middle Rogue PSP include diuron, hexazinone, norflurazon, terbacil, pronamide, and metribuzin for winter annual control, and trifluralin, pendimethalin, and EPTC for summer annual weed control.

A complete list of pesticides labeled for use on alfalfa hay in Oregon is available at pnwhandbooks.org
 Always read and follow the label when applying pesticides.



Middle Rogue Pesticide Stewardship Partnership Crop Calendar – Grass Hay

Timing	J	F	M	A	M	J	J	A	S	O	N	D
	Dormancy	Green Up	Vegetative	Transition	Heading / 1 st Cutting	1 st Cutting	Vegetative	Vegetative	Vegetative/ 2 nd Cutting	2 nd Cutting	Vegetative	Dormancy
Insects					Grasshoppers	Grasshoppers	Armyworms & Grasshoppers	Armyworms	Armyworms			
Diseases												
Weeds		Winter Annuals & Perennials	Winter Annuals & Perennials	Winter Annuals & Perennials		Summer Annuals & Perennials	Summer Annuals & Perennials			Winter Annuals & Perennials	Winter Annuals & Perennials	
Thermal Drift												
Wind Drift												
Inversion Drift												
Runoff												

Darker color indicates increased risk

Insect Pest Management
 Insect pests only occasionally cause enough damage to Southern Oregon grass hay fields to warrant treatment. Armyworms can be controlled with a range of insecticides including carbaryl as a spray or bait, bifenthrin, or malathion, all of which are tested for in surface water by the Middle Rogue PSP. Armyworms are an occasional pest of hayfields in eastern Jackson county. Treatment options include carbaryl, malathion, diflubenzuron or early mowing.

Disease Management
 Pathogens rarely cause enough damage to grass hay to warrant treatment. Selection of disease resistant forage varieties is the main strategy to prevent infection. No fungicides are currently labeled for perennial grass hay in Oregon, but several fungicides are labeled for use in grass-legume mixtures. Of those, azoxystrobin is the only compound monitored by the Middle Rogue PSP.

Weed Management
 Primary weed control for grass hay fields is the competition from vigorous forage crops. Proper irrigation, fertilization, and harvest management are key tools in weed control for hay fields. A wide range of herbicides are labeled for use on grass hay. Of the compounds tested for by the Middle Rogue PSP, MCPA, 2,4-D, dicamba, picloram, and triclopyr selectively control broadleaf plants, while diuron and metsulfuron methyl control both broadleaf and grass weeds, and glyphosate is labeled for spot spraying.

A complete list of pesticides labeled for use on grass hay in Oregon is available at pnwhandbooks.org
 Always read and follow the label when applying pesticides.



Middle Rogue Pesticide Stewardship Partnership Crop Calendar - Winter Grain

Timing	J	F	M	A	M	J	J	A	S	O	N	D
	Dormancy	Green Up	Vegetative	Transition	Heading	Maturity	Harvest			Planting	Vegetative Growth	Dormancy
Insects				Cereal Leaf Beetle	Cereal Leaf Beetle	Cereal Leaf Beetle	Cereal Leaf Beetle			Aphids & Hessian Fly	Aphids & Hessian Fly	
Diseases				Rust & Septoria	Rust & Septoria					Seed Treatments		
Weeds		Winter Annuals	Winter Annuals	Winter Annuals		Summer Annuals				Winter Annuals	Winter Annuals	
Thermal Drift												
Wind Drift												
Inversion Drift												
Runoff												

Management

Insect Pest Management
 Insect pests are controlled in winter grain crops with crop rotation, seed treatments, and occasionally foliar pesticide applications. Aphids and Hessian fly are controlled with seed treatments of neonicotinoid pesticides including imidacloprid. Carbaryl, malathion, chlorpyrifos, dimethoate, and methomyl are labeled for use on a range of insect pests in small grains, particularly winter wheat, and are monitored for by the Middle Rogue PSP.

Disease Management
 Diseases are primarily controlled through crop rotation and selection of disease-resistant varieties. Fungicides are used both as a seed treatment and as a foliar spray. Four fungicides monitored for by the Middle Rogue PSP and labeled for use in small grains are: pyraclostrobin, trifloxystrobin, azoxystrobin, and propiconazole. Barley yellow dwarf virus affects small grains; its spread is limited through the control of aphids.

Weed Management
 A range of grass and broadleaf weeds are problematic in small grain fields. Crop rotation and production of vigorous stands of grain reduce the need for chemical weed control. Of the compounds labeled for small grains and monitored for by the Middle Rogue PSP, pyraflufen, MCPA, 2,4-D, dicamba, and metsulfuron-methyl are used for broadleaf weed control, and diuron, pendimethalin, trifluralin, and metribuzin control broadleaf and certain grass weeds.

A complete list of pesticides labeled for use on winter grain crops in Oregon is available at pnwhandbooks.org
 Always read and follow the label when applying pesticides.

Assembled by Gordon Jones, Southern Oregon Research & Extension Center, for the Middle Rogue Pesticide Stewardship Partnership
 Sources: Godfred, L. et al. 2006. Pest Management of Small Grains—Insects. UC ANR Publication 8170.
 Himyck, R. et al. 2004. Pest Management Strategic Plan for PNW Small Grains. Western IPM Center.
 Jackson, L. 2006. Pest Management of Small Grains—Diseases. UC ANR Publication 8169.
 Jepson, P. 2017. Middle Rogue pesticide movement risk evaluation.

