

DR
HEO/Ex8
.4Ex8/2
:P43
:990
c.3

X

A0000305165557

\$2.00

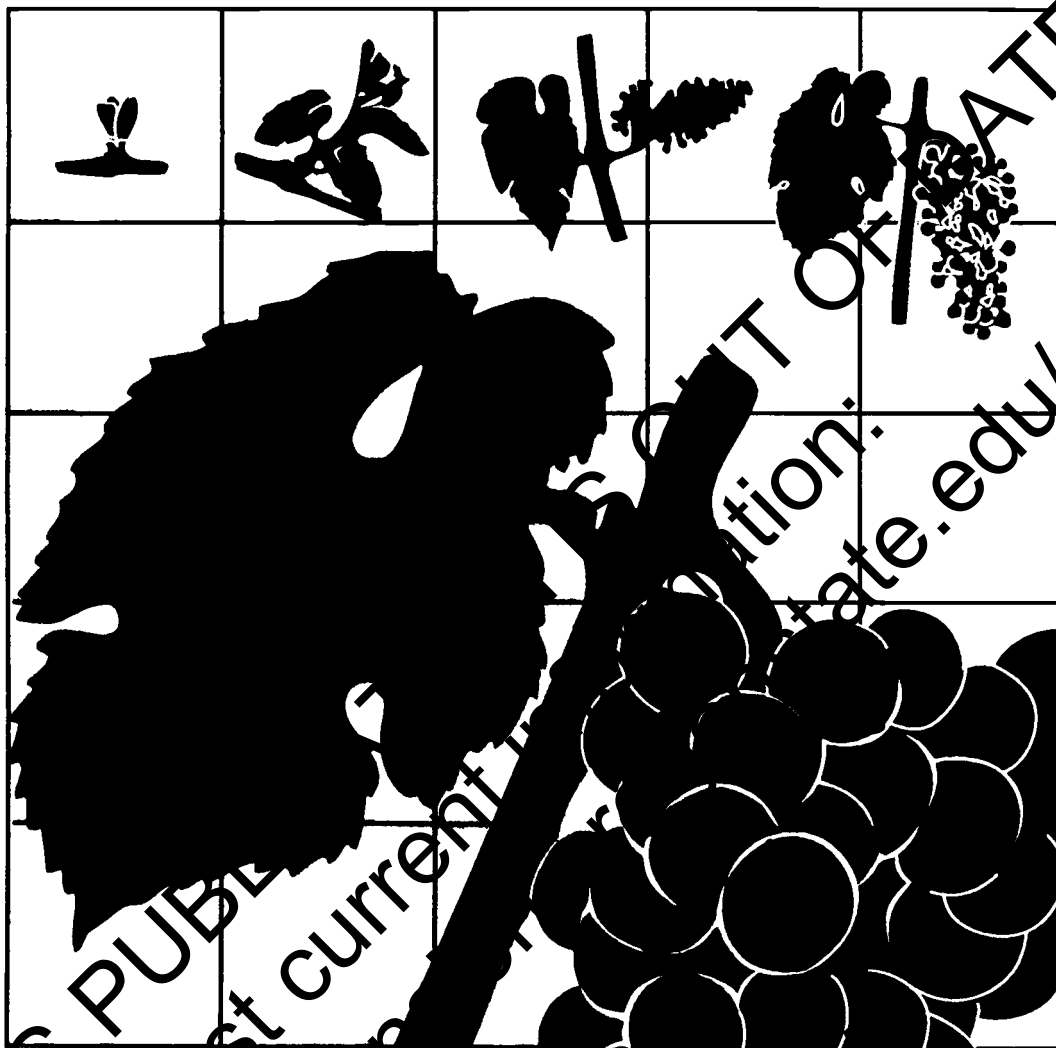
OREGON

APR 09 1990

1990 Pest Control Guide for Wine Grapes in Oregon

EM 8413 • February 1990

DISCOUNT



THIS PUBLICATION IS AVAILABLE FROM THE OREGON STATE UNIVERSITY EXTENSION SERVICE
For most current information, visit our website at <http://extension.oregonstate.edu/catalog>

EM 8413 • February 1990 • P43 • c.3

Pest control guide for wine grapes in Oregon



OREGON STATE UNIVERSITY
EXTENSION SERVICE

Grape growth stages

The sections of *Controlling insects and diseases* ("Dormant," "Delayed dormant," etc.) are matched to the following set of numbered growth stages. These stages were first established by K.W. Eichhorn and D.H. Lorenz, in their *Phanologische Entwicklungsstadien der Rebe*, published in Braunschweig, Federal Republic of Germany, in 1977.

These drawings are reprinted by permission of the European and Mediterranean Plant Protection Organization *Bulletin*, 14(2):295-298, September 1984.



1. Winter dormancy: Winter buds pointed to rounded, bright or dark brown according to cultivar, bud scales more or less closed according to cultivar.



2. Bud swelling: Buds expand inside the bud scales.



3. Wool stage: Brown wool clearly visible (doeskin).



5. Bud burst: Green shoot first clearly visible.



7. First leaf unfolded and spread away from shoot.



9. 2-3 leaves unfolded.



12. 5-6 leaves unfolded; inflorescence clearly visible.



15. Inflorescence swelling; flowers closely pressed together.



17. Inflorescence fully developed; flowers separating.



19. Beginning of flowering: First flowerhoods (calyptra) falling.



21. Early flowering: 25% of flowerhoods fallen.



23. Full flowering: 50% of flowerhoods fallen.



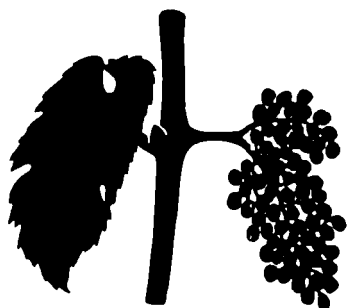
25. Late flowering: 80% of flowerhoods fallen.



27. Fruit set: Young fruits begin to swell; remains of flowers lost (shatter).

THIS PUBLICATION IS FOR MOST CURRENT INFORMATION. FOR MOST CURRENT INFORMATION, VISIT <http://extensioninformation.genstate.edu/catalog>

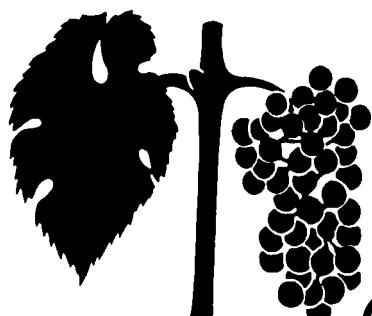
Introduction



29. Berries goat-sized; bunches begin to hang.



31. Berries pea-sized; bunches hang.



33. Beginning of berry touch.



35. Beginning of ripening (veraison.)



38. Beginning ripe for harvest.

The chemicals, formulations, and rates listed for insect, mite, disease, weed, and vertebrate pest control are among the best recommendations based on label directions, research, and vineyard use experience. Only a thorough knowledge of the vineyard, its variety, pest complex, and past pest problems will enable you to correctly select chemicals, rates, amount of water used per acre, and method of application for optimum pest control.

Occasionally, different formulations of a product or like formulations containing a different amount of active ingredient are also registered and effective for use on the pests listed. These products may also be used; we do not intend to discriminate against them. You may wish to consult their labels and determine if their use confers advantages over the products listed in this guide.

Always refer to the pesticide label for use instructions. It is the legal document regarding use patterns. Two questions are frequently asked about the chemical control of insects and diseases: "How much chemical do I use per acre?" and "What is the least amount of water I need per acre to apply in my concentrate sprayer?" Notice that the table on page 4 suggests an amount of formulated product (*not* active ingredient) to use per acre. This amount is based on a "typical" mature vineyard with average vigor and moderate pest pressure. Common sense indicates that less material may be needed (than that given) for immature vineyards. Conversely, more chemical (within label limits) may be required for vigorous, mature vines experiencing heavy pest pressure from multiple pests.

Many insecticide labels today indicate the minimum amount of water needed per acre to apply concentrate sprays of insecticides, as well as how to calculate the amount of chemical needed per acre in a concentrate sprayer.

CHECK LABEL BEFORE SPRAYING!!

Also:

1. Don't mix boron sprays with pesticides. The elevated pH of the boron spray solution weakens many insecticides.
2. Make sure any tank mixes of pesticides are compatible.
3. Use adjuvants and spreader stickers with caution.
4. Heavy, brief rain or extended rainfall (.75 inch for more than 24 hours) can remove pesticides from fruit and foliage. Reapplication may be necessary—within label limits.

Controlling insects and diseases

This list of the more effective pesticides, their rates, and appropriate timing is designed for growers who choose to use chemical controls. Remember these two points: (1) Oregon grape growers, particularly in western Oregon, have had very few problems with insect and mite pests; don't spray unless a problem actually exists. (2) Alternative control strategies may be available.

Insect or disease	Materials and formulation	Amount formulated material/ acre	Remarks and minimum days from last application and harvest (in bold type)
Dormant (Stage1). Apply before April.			
Mealybug	superior oil	4-6 gal	Apply in 200 gal per acre of water. Direct spray to trunk and main laterals.
	plus Parathion 4 EC	4-5 pt	
Crown gall	None		Remove galled vines. Bring up suckers only if well below the galled area.
Powdery mildew	None		The application of lime sulfur or copper sulfate during the dormant season has reduced overwintering inoculum in New York. However, the application of these materials has not been economically feasible.
Delayed dormant (Stages 2-10). Apply from before budbreak up to the time shoots are 4 inches long.			
Cutworms	Lannate	1 lb SP or 2 qt liquid	Most effective in early season control. May need to repeat in 7 days if heavy rains occur. Use in 200-300 gal water by ground sprayer. Complete coverage of cover crop, vines, and trellis is important.
	Sevin 50 W or XLR Plus	4 lb or 2 qt	
			Lorsan 4E may be used for cutworm control on nonbearing grapes only at the rate of 1 qt/A.
Shoots 6 inches long (Stages 16-19)			
Powdery mildew	sulfur	4 lb	Repeat as necessary at 10- to 14-day intervals. Don't enter treated areas for 24 hours. (See footnote 1.)
	Karathane WD	12.5 lb	
Prebloom (Stage 17)			
Cutworms	Lannate	1 lb SP or 2 qt liquid	This timing for cutworm control will usually be less effective than earlier season control.
	Sevin 50 W or XLR Plus	4 lb or 2 qt	

Insect or disease	Materials and formulation	Amount formulated material/acre	Remarks and minimum days from last application and harvest (in bold type)
Prebloom (Stage 17)—continued			
Powdery mildew	sulfur	4 lb	Repeat as necessary at 10- to 14-day intervals. Don't enter treated areas for 24 hours. (See footnote 1.)
	Karathane WD	1-2.5 lb	Repeat as necessary at 10- to 14-day intervals. 21 (See footnote 4.)
	Bayleton	2-3 oz	Use at 14- to 21-day intervals. A maximum of 18 oz can be applied per acre per season. Mites can become a problem if Bayleton is used excessively all season long. Alternate sprays with sulfur for better control of mites. 14
	Rally 40 W	3-5 oz	Do not apply more than 1.5 lb/A per year. 14
	Rubigan EC	3-6 oz	Do not apply more than 19 oz/A per year. Must have a minimum concentration of 2 oz/100 gal. 30
Bloom (Stages 21-25)			
Botrytis bunch rot	Rovral	1.5-2 lb	See footnote 2.
Late spring (Stages 19-27)			
Black vine weevil	Furadan 4F	1 qt	Apply between May 20 and June 20. See footnote 3. 9
Branch and twig borer			Effective insecticides are no longer registered for control of this pest. (See footnote 3.)
Leafhopper, mealybug, consperse stinkbug	Malathion 8 EC 5% dust 6% dust	1 qt or 40 lb or 50 lb	Apply as needed from mid-May to June. Leafhoppers are more common on vinifera and hybrid grapes. Mealybugs and stinkbugs are often a problem in the summer. Malathion gives marginal control of leafhopper and mealybug, and poor control of stinkbugs. 3
Thrips	Guthion 35 WP Parathion 25 WP or 4 EC	3 lb 1 lb or 1 qt	Thorough spray coverage is essential for optimal control of thrips. 28 for Guthion; 14 for Parathion.
Grape erineum mite	sulfur		See footnote 3.
Leafhoppers, stinkbugs	Triodan 50 W	2-3 lb	Check label before you use. Severe burning may result on certain varieties. 7
Early summer, late June and July (Stages 28-32)			
Cottony maple scale	Diazinon 4 EC 50 WP 2% dust	1 qt or 2 lb or 50 lb	Apply as soon as you first notice honeydew on leaves and fruit. A second application may be necessary in early August. 10
Grasshoppers	Sevin 50 W	2-3 lb	7
Spider mites	Omite 30 W	5-9 lb	7-day workers reentry interval. 21
Powdery mildew			See materials and remarks for prebloom stage.

Insect or disease	Materials and formulation	Amount formulated material/acre	Remarks and minimum days from last application and harvest (in bold type)
Summer, July to August (Stages 31-35)			
Grape mealybug, grape leafhopper	Malathion 5 EC	1.5-3 pt	When you first notice honeydew from mealybugs. 3
Thrips	Guthion 35 WP Parathion 25 WP or 4 EC	3 lb 4 lb or 1 qt	Apply in July and August if shoot injury is present. Do not apply Guthion more than 3 times per season. 28 for Guthion; 14 for Parathion
Mites	Omite 30 W Kelthane MF	5-9 lb 1.3-2.3 pt	Don't use more than twice per year. There's a 7-day worker reentry interval for grapes treated with Omite. 21
Powdery mildew			See materials and remarks for prebloom stage.
Beginning of berry touch (Stage 33)			
Botrytis bunch rot	Rovral	1.5-2 lb	See footnote 2.
Veraison (Stage 35)			
Botrytis bunch rot	Rovral	1.5-2 lb	See footnote 2.
Preharvest (Stages 35-38)			
Leafhoppers	Sevin 50 WP XIR plus Malathion 5 EC	2 lb or 2 qt 1.5-3 pt	Apply if needed to reduce leafhopper population before harvest. 7 for Sevin; 3 for Malathion
Botrytis bunch rot	Rovral	1.5-2 lb	See footnote 2.

Footnotes

1. The sulfur spray schedule listed is not intended for use on Concord or labrusca-type cultivars, which are sensitive to sulfur.
2. Resistance to Rovral has occurred in Canada and Europe using three or more applications. The bunch closing and/or veraison applications are the most important for disease control. A third application 3 weeks before harvest is necessary on susceptible cultivars.
3. This publication lists chemicals as well as some other methods of pest control. It's intended to serve as a supplement to the "Pest Management Guide for Wine Grapes in Oregon," which will be published as part of the *Oregon Winegrape Growers Guide*, currently in press. The "Pest Management Guide for Wine Grapes in Oregon" will have more complete descriptions of pests and more complete information on cultural methods of pest control.
4. Karathane products must be applied using a vehicle with a completely enclosed cab.

Controlling vertebrate pests

Control method	Control product	Time of application	Remarks
Birds			
Repellants	Sevana (garlic, cayenne pepper base)		Spray on grapes before bird feeding begins. <i>Beware:</i> Some wineries may not accept grapes sprayed with sevana because of possible aftertaste of wine.
	Scare devices		Place in vineyard before damage occurs: distress calls, exploder guns, cracker shells, foil, kites, eye spot balloons.
	Shooting		It's illegal to shoot <i>migratory</i> birds without a permit from the Oregon Dept. of Fish and Wildlife.
	Netting: Retrieval		Place on each side of canopy or drape over canopy before grapes ripen. Remove just before harvest. Labor costs may be high.
	Overhead		Support above vines on a frame. Costs at least \$600/acre. Net life: 7-15 years. Nearly 100% effective.
Deer			
Repellants	Thiram (TMTO), Repel, or Deer-Away		Spray on shoots browsed by deer. Repeat applications necessary as new shoots grow.
	Blood meal, human hair, etc.		Deer may become habituated to smells.
Fences	Electric (several strands 6-8' high; woven wire 4" woven wire to 7' high, topped with barbed wire)		Complete effectiveness if constructed properly. Preferred method for large vineyards. Electric costs 80-90¢/ft; woven costs \$1.10-\$1.25/ft.
Ground squirrels			
Trapping	#110 conibear trap		Don't use in areas that pets or children frequent.
Gassing	Rozol AP or AT (see footnote 1) The Giant Destroyer		Close burrows in morning, reopen and place in toxin and reclose. Repeat daily until activity ceases.
Poison baiting	Ramik Green (0.005% diphacinone) Rozol Paraffinized Pellets (0.005% chlorophacinone) ORCO Patrol Ground Squirrel Bait (0.005% chlorophacinone) Strychnine (see footnote 2)		Apply baits only in bait stations—in areas <i>inaccessible to pets and children</i> . Refill stations daily until bait is no longer consumed. Bury or burn all carcasses. Restrict all grazing animals from pastures for at least 30 days after completing baiting operations.
Meadow mice (vole)			
Hand baiting	Zinc phosphide (see footnote 1) Ramik Brown	When mice are active	Place baits in runways and burrow openings. Baits may poison nontarget animals.
Mechanical broadcast	Lime phosphate 6-10 lb/acre (see footnote 1)	In fall before leaf fall	Broadcast by hand or mechanical spreader. Don't apply to bare ground. Repeat if heavy rains occur or if mice reinvade area.

Control method	Control product	Time of application	Remarks
Meadow mice (voles)—continued			
Mechanical trail baiting	Lime phosphide (see footnote 1) in 6-7 lb treated oats or soft white wheat/acre		Soil must be moist so that artificial runways, 12-14" deep, remain intact. Build burrows close to trunks on each side of the row.
	Ramik Brown 10 lb/A	Apply twice	Check label.
Mountain beaver			
Trap	#110 Conibear		Preferably before breeding in spring.
Pocket gophers			
Trapping	Victor or Macabee, cinch trap	Autumn or spring	See footnote 3.
Poison baiting	Strychnine (see footnote 2) Chlorophacinone Diphacinone	Late winter and early spring	Poisons are mixed with seeds and fruits. Apply to fresh burrow systems and check for reinvasion.
Hand baiting	"Bait Bars" Rodenticide (1-2 tbsp per runway)		Place in main runways.
Mechanical trail baiting	1 oz strychnine (see footnote 2) in steam-crushed oat or milo grains added to 10 lb grain (1-2 lb bait/acre)	Late winter, early spring	Use burrow builder for large areas (see footnote 3). Build tunnels 6-10" deep in moist soil. Dispense bait every 5-10' in burrows 20-30' apart. <i>Caution:</i> Use a nonsticky, fast adhesive (such as Rhoplex)—not corn syrup—when you mix bait.
Gassing	The Giant Destroyer (46% sodium nitrate, 35% sulfur and 87% carbon) Detia Rotox AP (pellets) and AT (tablets), 57% aluminum phosphide (see footnote 1)		Not recommended for sandy or dry soils. Two cartridges or small piles of pellets per tunnel. If you use gas cartridges, cover breathing holes of burrows.
Propane gun	1/2 cup dusting sulfur/burrow		More effective than gassing. Ignite with propane burner. Avoid inhaling sulfur fumes. Seal all entrances to burrow. Soil should be damp.
Rabbits			
Bait	Pellets coated with strychnine (see footnote 2)		Place in bait stations.
Fencing			
Vine guards			

Footnotes

1. Restricted use.
2. Check with your county Extension agent for sources.
3. This publication lists chemicals as well as some other methods of pest control. It's intended to serve as a supplement to the "Pest Management Guide for Wine Grapes in Oregon," which will be published as part of the *Oregon Winegrape Growers Guide*, currently in press. The "Pest Management Guide for Wine Grapes in Oregon" will have more complete descriptions of pests and more complete information on cultural methods of pest control.

Managing vegetation in vineyards

Weeds such as deep-rooted perennials compete for soil moisture and nutrients in newly planted and mature vineyards, while light can become limiting in newly planted crops. Other weeds may host pests including plant viruses and can compete for pollinating bees in spring. Common dandelions, for example, are a preferred nectar source in spring.

Weed shifts. Excessive “weedy” vegetation in most vineyards is controlled by mowing or flailing row middles and applying herbicides within the vine row. Repeated use of the same or similar weed control practice results in a weed shift to species that tolerate these practices. Examples include prostrate weeds that tolerate flailing, deep-rooted perennials that tolerate cultivation or survive during the summer dry season, and weeds that either resist the herbicide or are selected from a natural population of susceptible biotypes.

Preventing weed shifts. You must eliminate weeds that survive cultivation, mowing, or flailing, specific herbicide treatments, or other routine cultural practices before the tolerant species or biotypes become established. Combine a variety of weed control practices or treatments, rotate practices and herbicides, and spot-treat with a hoe or registered herbicide when the weed first appears. Be sure to clean your equipment when you move from an infested field.

Sod covers. Native or planted grasses often are managed in row middles by mowing or flailing. Sod reduces soil erosion on sloping sites, improves traffic conditions in wet weather, and increases water infiltration and drainage. New sod varieties including dwarf cultivars that respond to minimal management practices such as drought, low fertility, or sublethal rates of postemergence herbicides are being introduced into various horticultural cropping systems. See your county Extension agent or request recent information about living mulches and their management.

Managing vineyard vegetation. Successful vegetation management in vineyards requires a comprehensive or year-round approach whereby you employ and alternate a combination of weed control practices over several years. Developing these strategies requires knowledge of each weed and weed control practice.

Begin by identifying weeds and gathering information about the effectiveness of each weed control practice. Consider costs and select herbicide combinations that you can apply together or in split applications, and that control the weeds present in your vineyard.

Note the action of each herbicide or how the chemical works in the plants. Then tank-mix and alternate the use of these products to reduce the chance of developing resistant species or biotypes. Often, a combination of mechanical and herbicidal treatments—plus hand removal or spot treatment with herbicide sprays or wipers—will provide the most effective year-round control.

Soil-active herbicides. You can apply persistent, soil-active herbicides during the winter dormant season; they’re activated by rain or sprinkler irrigation if dry conditions persist. Apply lower rates on sandy or gravelly soils, or

soils containing lower clay, organic matter contents, or cation exchange capacities.

Control existing vegetation by mixing a postemergence contact or translocated herbicide. After establishing an effective weed control program, reduce the rates and apply split applications of some herbicides such as simazine or diuron in fall and early spring to improve year-round weed control and decrease the possibility of injury.

Postemergence herbicides. Contact herbicides such as paraquat can be used to control existing vegetation, but lack residual control. Paraquat is a restricted-use pesticide and requires careful handling and secure storage. Glyphosate (Roundup) controls many weeds, but you must apply it at the correct stage of weed growth to obtain maximum movement into the roots (see label for details). Avoid applications to green bark or low branches. Additional surfactant is sometimes helpful, especially when weeds are growing slowly.

Notice the preharvest interval (PHI) listed on the label and avoid possible residues in food by applying the last treatment before that time.

Warning: The use of 2,4-D or similar materials on horticultural farms involves risk, not only to the crop to which it is applied, but also to other crops in adjacent or nearby fields. However, there may be instances in which guidance in the use of 2,4-D will enhance weed control with minimal chance for crop injury. Be careful to clean all 2,4-D from your equipment, or use separate sprayers to avoid possible crop injury.

Don’t use a volatile formulation of 2,4-D or similar material under any condition! Purchase only a product that lists the intended crop on the label.

The information provided in this publication is not intended to be a complete guide to herbicide use.

Before using any chemical, you should read the label recommendations on the container. Before a chemical can be recommended for a specific use, it must be thoroughly tested. The recommendation on the manufacturer’s label, when followed, can prevent many problems arising from the wrong use of a chemical.

Note: You must apply herbicides at exactly the correct rate and time to selectively control weed growth with minimal chance for injury to the trees or grapes. Obtain more consistent results by reading the herbicide label and other information about the proper application and timing of each herbicide. Suggested rates in this publication are stated as pounds active ingredient per acre (lb ai/A) or pounds acid equivalent per acre (lb ae/A).

Consult the product label for specific amounts of a particular formulation to apply per treated acre, or calculate the product rate. For band applications under the vineyard row, reduce the quantity of herbicide applied proportionally to the area within the row actually sprayed.

Numerous tank-mixes are labeled for use in vineyards, or growers can assume responsibility and mix products unless prohibited on the label. Grazing by livestock in vineyards often is prohibited when herbicides are applied for weed control.

Herbicide effectiveness on weeds in vineyards

Weed family ¹	Cultural			Soil-applied herbicides							Postemergence herbicides					
	Cultivation	Mowing/flailing	Sod Competition	Simazine	Diuron	Norflurazon (Solican)	Dichlobenil (Casoron-Norosac)	Oryzalin (Surflan)	Napropamide (Devrinol)	Pronamide (Kerb)	Paraquat	Oxyfluorfen (Goal)	Glyphosate (Roundup)	2,4-D	Fluazifop (Fusilade 2000)	Sethoxydim (Poast)
Amaranth or Pigweed																
Pigweed, redroot (<i>Amaranthus retroflexus</i>)	G	G	F	G	G	F	G	G	G	P	G	G	G	G	P	P
Pigweed, tumble (<i>Amaranthus graecizans</i>)	G	G	F	G	G		G		G		G	G	G	P	P	
Powell amaranth (<i>Amaranthus powellii</i>)	G	G	F	G	G		G	G	G		G	G	G	P	P	
Buckwheat (Knotweed)																
Buckwheat, wild (<i>Polygonum convolvulus</i>)	G	G	G	G	G		G				G	G	G	P	P	
Dock, broadleaf (P) (<i>Rumex obtusifolius</i>)	F	P	F		F		G	F			+	G	G	P	P	
Dock, curly (P) (<i>Rumex crispus</i>)												F			P	P
Knotweed, prostrate (<i>Polygonum aviculare</i>)	F	P	F	G	E		G	G	F	F	+	F	G	F	P	P
Ladysthumb (<i>Polygonum persicaria</i>)	G	F	F	F	F	F	G	F	P		G	F	G	G	P	P
Sorrel, red (P) (<i>Rumex acetosella</i>)	G	P	F		G*		G			F	+	G*	G		P	P
Caltrop																
Puncturevine (<i>Tribulus terrestris</i>)	G	P	P	P	P	G	G	F	F		G		G	G	P	P
Carrot																
Carrot, wild (B) (<i>Daucus carota</i>)	G	F	F	G	G	G	G			P	G	P	G	G	P	P
Composite																
Chicory (*) (<i>Cichorium intybus</i>)		F	P							P					P	P
Cocklebur, broadleaf (<i>Xanthium strumarium</i>)		G	F							P		G*	G	G	P	P
Cudweed, low (<i>Gnaphalium uliginosum</i>)		G	P	G						P			G	G	P	P

G = good (80-94%); F = fair (60-79%); P = poor (less than 59%); (*) = seedling control only; (+) = control of above-ground vegetation only; (√) = preemergence only.

¹ Weeds not identified as biennials (B) or perennials (P) are considered annuals.

Weed family ¹	Cultural			Soil-applied herbicides							Postemergence herbicides					
	Cultivation	Mowing/flailing	Sod Competition	Simazine	Diuron	Norflurazon (Solican)	Dichlobenil (Casoron; Norosac)	Oryzalin (Surflan)	Napropamide (Devrinol)	Pronamide (Kerb)	Paraquat	Oxyfluorfen (Goal)	Glyphosate (Roundup)	2,4-D	Fluazifop (Fusilade 2000)	Sethoxydim (Poast)
Composite—continued																
Dandelion, common (P) (<i>Taraxacum officinale</i>)	F	P	F	*	P	*	G	P	*	P	+	G*	G	G	P	P
Dandelion, false (spotted catsear) (P) (<i>Hypochaeris radicata</i>)	P	P	P	*	P	*	G	P	P	P	+	G	G	F	P	P
Devils beggarsticks (<i>Bidens frondosa</i>)	G	F	F		G											
Goldenrod, western (P) (<i>Solidago occidentalis</i>)					P			P	F	P	P	G				P
Groundsel, common (<i>Senecio vulgaris</i>)	G	P	F	F	F				G	P	G	G	G	G	P	P
Hawkbit, hairy (P) (<i>Leontodon nudicaulis</i>)		P	F	*	*			*	*	*	+	G			P	P
Hawksbeard, bristly (<i>Crepis setosa</i>)	G	F	F				G		P	G	G	G	G	P	P	P
Horseweed (P) (<i>Conyza canadensis</i>)	F	F	P		F			P	F	P	+	P	G		P	P
Knapweed, diffuse (<i>Centaurea diffusa</i>)										P			G	G	P	P
Mayweed or dog fennel (<i>Anthemis cotula</i>)	G	P	F							P	*	F	G		P	P
Pineappleweed (<i>Matricaria matricarioides</i>)	G	P	F		G			P	G	P	*	F	G		P	P
Prickly lettuce (<i>Lactuca scariola</i>)	G	F	G		G			P	G	P	G	G	G	G	P	P
Ragweed, common (<i>Ambrosia artemisiifolia</i>)	G	F	F							P		*	G	G	P	P
Salsify, western (B) (<i>Tracopogon dubius</i>)					P			P	P	P	F	P			P	P
Sowthistle, annual (<i>Sonchus oleraceus</i>)	F	F	G		F			P	G	P		G	G	G	P	P
Sowthistle, spiny (<i>Sonchus asper</i>)	G	F	G		F			P	G	P			G	G	P	P
Tansy ragwort (B) (<i>Senecio jacobaea</i>)	F	P	F		P		G	P	P	P	*		G	G	P	P
Thistle, bull (B) (<i>Cirsium vulgare</i>)	G	P	F		G		G			P	P	F*	G	G	P	P
Thistle, Canada (P) (<i>Cirsium arvense</i>)	P	P	P		P		G	P	P	P	+		G	F	P	P

G = good (80-94%); F = fair (60-79%); P = poor (less than 59%); (*) = seedling control only; (+) = control of above-ground vegetation only; (√) = preemergence only.

¹ Weeds not identified as biennials (B) or perennials (P) are considered annuals.

Weed family ¹	Cultural			Soil-applied herbicides							Postemergence herbicides					
	Cultivation	Mowing/flailing	Sod Competition	Simazine	Diuron	Norflurazon (Solican)	Dichlobenil (Casoron-Norosec)	Oryzalin (Surflan)	Napropamide (Devrinol)	Pronamide (Kerb)	Paraquat	Oxyfluorfen (Goal)	Glyphosate (Roundup)	2,4-D	Fluazifop (Fusilade 2000)	Sethoxydim (Poast)
Evening primrose																
Fireweed (P) (<i>Epilobium angustifolium</i>)	G	G	F		G				P		G	G	G	F	P	P
Figwort																
Mullein, common (B) (<i>Verbascum thapsus</i>)	G	F			P		G		P		F		F	F	P	P
Speedwell, birdseye (<i>Veronica persica</i>)	G	F	F		P		G		P		G		G	F	P	P
Speedwell, creeping (<i>Veronica filiformis</i>)	G	F	F						P				G	F	P	P
Speedwell, ivyleaf (<i>Veronica hederifolia</i>)	G	F	F		P				P		G	G	G	F	P	P
Toadflax, yellow (P) (<i>Linaria vulgaris</i>)					P				P		P			P	P	P
Geranium																
Filaree, redstem (<i>Erodium cicutarium</i>)	G	P	F		P	F	G	G	P		G	G	G	G	P	P
Geranium, cutleaf (<i>Geranium dissectum</i>)	G	P	F		G		G				G		G	F	P	P
Geranium, dovefoot (<i>Geranium molle</i>)	G	P	F		G		G		G	P	G	F	G		P	P
Goosefoot																
Kochia (<i>Kochia scoparia</i>)	G	F	F		F	G	G	P	P	F	F	G	G	F	P	P
Lambsquarters, common (<i>Chenopodium album</i>)	G	G	F		G	G	G	G	G	F	F	F	G	G	P	P
Russian thistle (<i>Salsola kali</i>)					P	G	G	F	P	P	F	G	G	F	P	P
Grass (annual)																
Barnyardgrass (<i>Echinochloa crus-galli</i>)	G	F	F		F	G	G	G	F-G	P	G	P	G	P	G	G
Bluegrass, annual (<i>Poa annua</i>)	G	P-F	F		G	G	G	G	G	G	G	F*	G	P	P	P
Brome, downy (<i>Bromus tectorum</i>)	G	F	F		G	P	G	G	F-G	G	G	F√	G	P	G	G
Brome, ripgut (<i>Bromus rigidus</i>)	G		F		G	G	G	G	G	G	G	F√	G	P		

G = good (80-94%); F = fair (60-79%); P = poor (less than 59%); (*) = seedling control only; (+) = control of above-ground vegetation only; (√) = preemergence only.

¹ Weeds not identified as biennials (B) or perennials (P) are considered annuals.

Weed family ¹	Cultural			Soil-applied herbicides							Postemergence herbicides					
	Cultivation	Mowing/flailing	Sod Competition	Simazine	Diuron	Norflurazon (Solican)	Dichlobenil (Casoron-Norosac)	Oryzalin (Surflan)	Napropamide (Devrinol)	Pronamide (Kerb)	Paraquat	Oxyfluorfen (Goal)	Glyphosate (Roundup)	2,4-D	Fluazifop (Fustade 2000)	Sethoxydim (Poast)
Grass (annual)—continued																
Bromes, annual (<i>Bromus</i> spp.)	G		F			G		G	G	G	G	F√	G	P	G	G
Crabgrass (<i>Digitaria</i> spp.)	G	P-F	F	P-F	F-G	F	G	G		P	G	G	P	G	G	
Foxtail, green (<i>Setaria viridis</i>)	G		F	P-F	F	F	G	G	F	F	G	F√	G	P	G	G
Foxtail, yellow (<i>Setaria glauca</i>)	G				F			G	G	F	G	F√	G	P	G	G
Johnsongrass seedlings (<i>Sorghum halepense</i>)	G										G	G	P			
Oat, wild (<i>Avena fatua</i>)	G	G	F	F	P	G	F	P	G	G	G	G√	G	P	G	G
Ryegrass, annual or Italian (<i>Lolium multiflorum</i>)	G	F	F	G	G				G	G	G	G√	G	P	F-G	G
Sandbur, longspine (<i>Cenchrus longispinus</i>)	G			F	F	F		G	G		F	G	P			
Velvetgrass (<i>Holcus lanatus</i>)			P						P	G	F			P	F-G	G
Witchgrass (<i>Panicum capillare</i>)					P			G	G		G			P	G	G
Grass (perennial)																
Bentgrass (<i>Agrostis tenuis</i>)	G	P	F	*	*	*	G	*	*	G	+	G	P	G	G	
Bermudagrass (<i>Cynodon dactylon</i>)	F	P	P		P			P	P	P	P	G	G	P	G	F-G
Fescue, red creeping (<i>Festuca rubra</i>)	F	P	P							G		G	P	P	P	
Foxtail, slender (<i>Alopecurus myosuroides</i>)										P		P				
Quackgrass (<i>Agropyron repens</i>)	P	F	P	P	P	P	G	P	P	G	F	P	G	P	F	P
Madwort																
Bedstraw, catchweed (<i>Galium aparine</i>)	G	P	G		P		G	F		P	P	G*		P	P	P
Bedstraw, corn (<i>Galium tricorne</i>)	G	P	G			G									P	P
Mallow																
Mallow, common (<i>Malva neglecta</i>)	G	P	F	F	P	F	F	P	G	P		P	F	F	P	P

G = good (80-94%); F = fair (60-79%); P = poor (less than 59%); (*) = seedling control only; (+) = control of above-ground vegetation only;
(√) = preemergence only.

¹ Weeds not identified as biennials (B) or perennials (P) are considered annuals.

Weed family ¹	Cultural			Soil-applied herbicides							Postemergence herbicides					
	Cultivation	Mowing/flailing	Sod Competition	Simazine	Diuron	Norflurazon (Solican)	Dichlobenil (Casoron-Norosac)	Oryzalin (Surflan)	Napropamide (Devrinol)	Pronamide (Kerb)	Paraquat	Oxyfluorfen (Goal)	Glyphosate (Roundup)	2,4-D	Fluazifop (Fusilade 2000)	Sethoxydim (Poast)
Mint																
Henbit (<i>Lamium amplexicaule</i>)	G	P	F	G	G	G	G	F	P	F	G	G	G	F	P	P
Red deadnettle (<i>Lamium purpureum</i>)	G	P	F	G	G	G	G		P	F	G	G	F	P	P	
Morningglory																
Field bindweed (P) (<i>Convolvulus arvensis</i>)	P	P	F	P	P		P-F	P	P	F	+	+	F-G	F	P	P
Mustard																
Bittercress, little (<i>Cardamine oligosperma</i>)	G	P	F		G		G	P	G	P	G	G	G	G	P	P
Cress, hoary (P) (<i>Cardaria draba</i>)	G	P		*	*		G								P	P
Flixweed (<i>Descurainia sophia</i>)					G			F	F	F√		F			P	P
Mustard, hedge (<i>Sisymbrium officinale</i>)	F	F		*	*		F-G	P	F	F		F	G	G	P	P
Mustard, wild (<i>Brassica kaber</i>)	G	F	F	G	F	G	G	G	G	F√	G	F	G	G	P	P
Shepherdspurse (<i>Capsella bursa-pastoris</i>)	G	F	F	*	G	G	G		P	F√	G	P	G	G	P	P
Nightshade																
Nightshade, black (<i>Solanum nigrum</i>)	G	F	G	G	G	G	G	P	P	F√	G	G	G	G	P	P
Nightshade, curled (<i>Solanum tripterum</i>)	G	F	G		G					F√	G	G	G	G	P	P
Nightshade, hairy (<i>Solanum sarracoides</i>)	G	F	G	G	G	G	G	P	P	F√	G	G	G	G	P	P
Pink																
Chickweed, common (<i>Stellaria media</i>)	G	P	G	G	G		G	G	G	G	G	P	G	G	P	P
Chickweed, mouseear (<i>Cerastium vulgatum</i>)	G	P	G	G	G		G	G	G	G	G	P	G	F	P	P
Corn spurry (<i>Spergula arvensis</i>)	G	P	G	G	G		G	G	G		G	G	G	P	P	P

G = good (80-94%); F = fair (60-79%); P = poor (less than 59%); (*) = seedling control only; (+) = control of above-ground vegetation only; (√) = preemergence only.

¹ Weeds not identified as biennials (B) or perennials (P) are considered annuals.

Weed family ¹	Cultural			Soil-applied herbicides							Postemergence herbicides					
	Cultivation	Mowing/flailing	Sod Competition	Simazine	Diuron	Norflurazon (Solican)	Dichlobenil (Casoron-Norosac)	Oryzalin (Surflan)	Napropamide (Devrinol)	Pronamide (Kerb)	Paraquat	Oxyfluorfen (Goal)	Glyphosate (Roundup)	2,4-D	Fluazifop (Fusilade 2000)	Sethoxydim (Poast)
Plantain																
Plantain, broadleaf (P) <i>(Plantago major)</i>	G	P	F	G	P		G			P	G	F*	G	G	P	P
Plantain, buckhorn (P) <i>(Plantago lanceolata)</i>	G	P	F	G	P		G			P	G	F*	G	G	P	P
Purslane																
Minerslettuce <i>(Montia perfoliata)</i>	G	F	G	G	G	G	G		P		G	G	G	G	F	P
Purslane, common <i>(Portulaca oleracea)</i>	G	P	F	G	G	F	G	G	F	F	G	G	G	G	F	P
Rose																
Blackberry, evergreen (P) <i>(Rubus laciniatus)</i>	F	F	F	P	P			P	P	P*	+	P	G	F	P	P
Blackberry, Himalaya (P) <i>(Rubus procerus)</i>	F	F	P	P	P			P	P	P	+	P	G	F	P	P
Blackberry, trailing (P) <i>(Rubus vitifolius)</i>	G	P	F	P	P			P	P	P	+	P	G	F	P	P
Sedge																
Nutsedge, yellow (P) <i>(Cyperus esculentus)</i>	P	P	F	P	P	F	G	P	P	P	F	P	F	P-F	P	P
Spurge																
Spurge, leafy (P) <i>(Euphorbia esula)</i>		F					G			P		P		P-F	P	P
Spurge, prostrate <i>(Euphorbia humifusa)</i>		F		P	P	F	G	F	P		G		G	F	P	P
St. Johnswort																
St. Johnswort (P) <i>(Hypericum perforatum)</i>	G	F	F		P		G		P		+		G	F	P	P
Sumac																
Poison oak, Pacific (P) <i>(Rhus diversiloba)</i>	G	F	P	P	P	P		P	P		+		G	F	P	P
Teasel																
Teasel <i>(Dipsacus sylvestris)</i>	G	+	F				G				G		G	G	P	P

G = good (80-94%); F = fair (60-79%); P = poor (less than 59%); (*) = seedling control only; (+) = control of above-ground vegetation only; (v) = preemergence only.

¹ Weeds not identified as biennials (B) or perennials (P) are considered annuals.

Herbicides for grapes

(Note: Some vinifera cultivars may be sensitive to certain herbicides.)

Herbicide	Active ingredient	Remarks and limitations
Site preparation		
<ul style="list-style-type: none"> • glyphosate Roundup 	0.5 to 5 lb ai/A (0.38 to 3.75 lb ae/A or 1 to 2% solution for spot treatments)	Apply to weeds at least 10 days before planting the crop. Use highest rate on field bindweed. Don't apply if weeds are under stress from drought, weather, or maturity. Rainfall within 6 hours after application may reduce effectiveness. (Inhibits production of 3 amino acids and protein synthesis.)
New plantings		
<ul style="list-style-type: none"> • napropamide Devrinol 	4 lb ai/A	Apply after transplanting to firm soil before weeds germinate. Water the same day of treatment to wet the soil 2 to 4" deep to reduce degradation by sun and activate the herbicide. Where convenient, shallow mechanical incorporation appears to improve activity. (Inhibits root growth.)
<ul style="list-style-type: none"> • oryzalin Surflan 	2 to 4 lb ai/A	Apply after transplanting to firm soil before weeds germinate. Requires sprinkler irrigation, rainfall, or shallow cultivation (1 to 2") for activation. Rate depends on duration of weed control desired. (Inhibits mitosis, primarily in roots.)
<ul style="list-style-type: none"> • pendimethalin Prowl (nonbearing crop only) 	2 to 4 lb ai/A	Apply to newly planted grape vines before buds swell and after the ground has settled around vines and cracks are absent. Apply the spray directly to the ground beneath vines. Overhead watering is required within 7 days for herbicide activation. Don't feed forage or graze livestock. (Inhibits mitosis in roots and shoots.)
<ul style="list-style-type: none"> • trifluralin (several brands) 	0.5 to 1.0 lb ai/A	Apply preplant and incorporate immediately by cross-disking or rototilling. Use lower rates on sandy soils or soil containing low organic matter levels. (Inhibits mitosis in roots and shoots.)
<ul style="list-style-type: none"> • isoxaben Gallery (non- bearing crop only) 	0.495 to 0.998 lb ai/A (0.66 to 1.33 lb product/A)	Identify weeds and adjust rates according to charts listed on label. Apply in late summer to early fall, in early spring, or immediately after cultivation to debris-free soil surface. Activate with 0.5" water or shallow cultivation before weeds begin to emerge. Chemical stability remains adequate when left on soil surface for 21 days. Don't apply to newly transplanted crops until the soil has settled and cracks disappear. (Inhibits mitosis.)
<ul style="list-style-type: none"> • fluazifop Fusilade 2000 (nonbearing crop only) 	Consult label	Identify grass weeds and adjust rates, depending on susceptibility and stage of growth, according to label instructions. Apply to actively growing grasses, or within 7 days after irrigation, as a directed spray with 1% crop oil or 0.25% nonionic surfactant. Erratic results often occur when grasses are stressed from lack of vigor, drought, high temperature, low fertility, grass stage of growth, and unknown environmental factors. More mature grasses and quackgrass can be controlled, but may require two applications. Annual bluegrass and all fine fescues resist treatment. Don't apply to crops that you'll harvest within 1 year of treatment. Grazing is prohibited. (Inhibits fatty acid production, cell membranes, and new growth.)

Herbicide	Active ingredient	Remarks and limitations
New plantings—continued		
• sethoxydim Poast (non-bearing crop only)	0.29 to 0.478 lb ai/A (1.5 to 2.5 pt product/A)	Apply to actively growing grasses listed on label at the 4-to 5-leaf stage (6 to 12" tall). Add 2 pt of a nonphytotoxic crop oil concentrate for ground application, which improves penetration into leaves within 1 to 2 hours. Adding urea ammonium nitrate (UAN) or ammonium sulfate (AMS) may enhance control of certain grass weeds. Consult Extension guides or knowledgeable individuals about susceptible species within your area. Control often is erratic when grasses are stressed from lack of vigor, drought, high temperature, low fertility, grass stage of growth, and unknown environmental factors. Annual bluegrass and fine fescues resist treatment in the Pacific Northwest. Quackgrass is suppressed. Don't apply if you'll harvest crop within 1 year after treatment. Don't mix or apply with any other pesticide, additive, or fertilizer except as directed on the label. (Inhibits fatty acid production, cell membranes, and new growth.)
• oxyfluorfen Goal 1.6E	0.5 to 2.0 lb ai/A (1.25 to 5.0 qt/product)	Controls broadleaf weeds pre- and postemergence, depending on rate of application and weed species. For preemergence control of susceptible weeds, use the 2.0 lb ai or 5 qt/A rate on a clean, weed-free soil surface. Apply only to healthy vines. Direct the spray toward the base of vines, avoiding direct plant contact. (Acts as a contact, either directly on broadleaf weeds or at soil surface as weeds emerge.)
• metolachlor Dual	2 to 4 lb ai/A	Apply to weed-free soil, but adjust rates according to label instructions, based on soil texture and weed intensity. Don't apply to vines planted less than 30 days or to vines with harvestable fruit during that season. Avoid spraying foliage. (Inhibits seedling roots and/or shoots.)
• monocarbamide hydrogensulfate Enquik	20 to 30 gal product/A	For contact weed control and nitrogen/sulfur fertilization. Dilute in an equal volume of water and apply when nitrogen fertilization would normally occur. Add a nonionic surfactant at 0.125% by volume and delay irrigation 1 week to increase activity. Note handling and equipment precautions described on the label—this product is caustic! (Acts as a contact with nitrogen and sulfur nutrients.)
Established plantings—winter applications that persist in the soil		
• diuron (several brands)	1.6 to 3.2 lb ai/A (2.0 to 4.8 lb in Idaho)	Apply in winter as single application, or split and apply half doses in October and March. Reduce rate or rotate with other herbicides after effective weed control is achieved. Use in vineyards established at least 3 years. Don't apply on very sandy or gravelly soils. Can be rotated with simazine or other herbicides to reduce weed shifts. (Inhibits photosynthesis.)
• simazine Princep	1.6 to 4.0 lb ai/A	Apply in winter as single application or split and apply half doses in October and March. Reduce rate or rotate with other herbicides after effective weed control is achieved. Requires surface moisture for activation. Use in vineyards established at least 3 years. Don't apply on very sandy or gravelly soils. Can be rotated with diuron or other herbicides to reduce weed shifts. (Inhibits photosynthesis.)
• nonflurazon Soliteam	2 to 4 lb ai/A	Labeled for use in Oregon and Washington only. Apply to weed-free soil in fall to early spring when soil surface is reasonably free of plant residue. Requires ample rainfall for activation. Don't use on grapes established less than 2 years in the field. Don't use on gravelly, sandy, or loamy sand soils. (Inhibits yellow pigment formation causing leaching of green chlorophyll.)

Herbicide	Active ingredient	Remarks and limitations
Established plantings—winter applications that persist in the soil—continued		
• dichlobenil Casoron or Norosac	4 to 6 lb ai/A	Measure and apply exact amounts to a known area to ensure accurate application. Apply in midwinter when temperatures are cold, just before a cold rain. Avoid applications under warm or dry conditions to reduce vaporization and loss of the chemical. Results in Oregon suggest that adequate control of several perennial weeds was achieved at 4, 3, and 2 lb ai/A during the 1st, 2nd, and 3rd years with repeat applications. Grazing livestock is prohibited. Use in vineyards established at least 4 weeks, preferably the winter following planting. (Inhibits roots and shoots.)
• napropamide Devrinol	4 lb ai/A	Apply in fall through spring before weeds germinate or apply foliar-active herbicide to control existing vegetation. Irrigation or shallow incorporation is recommended for treatment made November through February, if no rainfall occurs within 2 weeks after application. Irrigate within 24 hours to wet soil 2 to 4" deep when applied March through October. Shallow mechanical incorporation appears to enhance activity. Performance is reduced with excessive plant residues on soil surface. Don't apply within 35 days of harvest. (Inhibits root growth.)
• oryzalin Surflan	2 to 6 lb ai/A	Apply late fall or early spring to bare soil or after existing vegetation has been destroyed by tillage or use of a foliar-active herbicide. Use higher rates or split treatments and apply in fall and spring for longer residual control. Irrigate with 0.5" water or rainfall to activate herbicide. Shallow cultivation can provide control of newly germinated weeds without reducing herbicide activity. (Inhibits mitosis, primarily in roots.)
• pronamide Kerb	1 to 4 lb ai/A	Formulations not packaged in a water-soluble bag are restricted-use pesticides. Apply only once in fall or winter, preferably October to December when temperatures are 55°F or below. Use lower rates on annual grasses and light soil textures; use higher rates on perennial grasses such as quackgrass and fine-textured soils. Requires moisture from rain or irrigation for activation. Use only on vineyards established at least 1 year or on spring-planted grapes established at least 6 months. (Inhibits root growth.)
• trifluralin (several brands)	1 to 2 lb ai/A	Apply and incorporate by thorough mixing immediately to a depth of 1-2" and with equipment that won't injure tree roots. Don't apply within 60 days of harvest. (Inhibits mitosis in roots and shoots.)

Established plantings—directed applications in grape rows

• glyphosate Roundup	Spray: consult label	Select application equipment to prevent crop injury by directing spray or use selective applicators. Adjust concentrations, depending on equipment. Consult label about rate and time of application, especially for perennial weeds. Adding surfactant, or mixing ammonium sulfate according to label instructions, may improve control of slightly stressed weeds. Don't allow drift or mist to contact green foliage, green bark, suckers, or vines and renewals less than 3 years old. Allow minimum of 14 days preharvest interval. When repeat applications are necessary, don't exceed 10.6 lb ai/A (10.6 qt) in 1 year. (Inhibits production of 3 amino acids and protein synthesis.)
	Wiper: 33% solution	Mix 1 gal product to 2 gal water and wipe weeds avoiding contact with desirable vegetation. In severe infestations, reduce equipment ground speed or apply in 2 directions to ensure contact with wiper. (See remarks above.)

Herbicide	Active ingredient	Remarks and limitations
Established plantings—directed applications in grape rows—continued		
• 2,4-D amine Miller's Envy 2,4-D	See label	Apply after shatter following bloom and before grape shoots reach the ground. Apply when weeds are in bud to early bloom stage and growing vigorously. Use a directed-shielded boom with low-pressure flooding nozzles to reduce possible drift and injury. <i>Grapes are extremely sensitive to 2,4-D.</i> Avoid all contact or drift to grape leaves and young shoots or stems. Don't apply to vineyards established less than 3 years. There's a high potential for injury to grapes if you apply it other than during the dormant season. (Mimics natural plant hormones.)
• paraquat Gramoxone Super	0.5 to 1.0 lb ai/A	A restricted-use pesticide. Don't ingest or inhale spray mist. Wear protective shields, respirators, and clothing. Apply in 30 to 150 gal water with additional nonionic wetting agent to ensure complete wetting. Apply as a directed-shielded spray toward base of vines when weeds are growing vigorously and new growth is 1 to 6" high. Don't allow stems, fruit, or spray to contact green stems, fruit, or foliage. Avoid windy conditions. (Acts as contact; absorbs energy produced by photosynthesis, forming peroxides that disrupt living cells.)
• oxyfluorfen Goal 1.6E	0.5 to 2.0 lb ai/A (1.25 to 5.0 qt product/A)	Controls broadleaf weeds pre- and postemergence, depending on rate of application and weed species. For preemergence control of susceptible weeds, use the 2.0 lb ai or 5 qt/A rate on a clean, weed-free soil surface. Apply only to healthy vines. Spray toward the base of trees or vines, avoiding direct plant contact. (Acts as contact, either directly on broadleaf weeds or at soil surface as weeds emerge.)
• monocarbamide hydrogensulfate Enquik	20-30 gal product/A	For contact weed control and nitrogen/sulfur fertilization. Dilute in an equal volume of water and apply when nitrogen fertilization would normally occur. Add a nonionic surfactant at 0.125% by volume and trickle irrigation to work to increase activity. Note handling and equipment precautions described on the label—this product is caustic! (Acts as a contact with nitrogen and sulfur nutrients.)

THIS PUBLICATION IS OUT OF DATE.
 For most current information, please contact your local extension office.
<http://extension.oregonstate.edu/catalog>

Basic elements of safe pesticide use

1. Always read the label with care. This is the first step in selecting the right material for the job. Never rely on your memory. Before opening the container, pay strict attention to warnings and cautions printed on the label.
2. Keep spray and dust materials out of the reach of children, pets, and irresponsible persons. Storage outside of the home, away from food and feed, and under lock and key is the safest method.
3. Store only in the original container and keep tightly closed.
4. NEVER smoke, eat, or drink while applying pesticides.
5. Avoid inhalation or direct contact. Always wear protective clothing and safety devices as recommended on the label.
6. Avoid spills. If spills occur, take immediate action to remove contaminated clothing and wash thoroughly.
7. After each application, bathe and change to clean clothing. Wash clothing after each use. Always use fresh clothing when starting new application.
8. Avoid contamination of fish ponds and water supplies. Cover feed and water containers when treating around livestock or pet areas.
9. Keep separate equipment for use with hormone-type herbicides to avoid accidental injury to susceptible plants. Also avoid applications under wind conditions that could create drift to non-target areas.
10. Rinse empty containers three times before disposing of them. Add the rinse to the spray tank and dispose of containers according to local regulations to avoid hazard to humans, animals, and the environment.
11. Follow label directions for mixing and application to keep residues within the limits prescribed by law.
12. Plan ahead. Discuss with your physician the materials you will be using during the season so that he or she can be prepared to provide the appropriate treatment in case of accidental exposure. If symptoms of illness occur, call the physician or get the patient to a hospital immediately. Always provide the medical personnel with as much information as possible.
13. Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

Oregon Poison Control and Drug Information Center
The Oregon Health Sciences University
3181 S.W. Sam Jackson Park Road
Room 2519, University Hospital North
Portland, OR 97201
Phone: (503) 279-8968
Oregon toll-free 1-800-452-3165



Prepared by Glenn C. Fisher, Extension entomologist; Jay W. Pscheidt, Extension plant pathologist; Bernadine C. Strik, Extension horticulture specialist (small fruits/orniculture); and Ray D. William, Extension horticulture specialist (weed science); all of Oregon State University.

The information in this pest management guide is valid for 1990. The mention of commercial products in this publication does not constitute endorsement by the Oregon State University Extension Service, nor should exclusion be interpreted as criticism of any item, form, or service. Due to constantly changing laws and regulations, the Oregon State University Extension Service can assume no liability for the suggested use of chemicals contained in this guide. Pesticides should be applied according to the label directions on the pesticide container.

Extension Service, Oregon State University, Corvallis, O.E. Smith, director. This publication was produced and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Oregon State University offers educational programs, activities, and materials without regard to race, color, national origin, sex, age, or disability as required by Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and Section 504 of the Rehabilitation Act of 1973. Oregon State University Extension Service is an Equal Opportunity Employer.