

WEEDS

INTEGRATED WEED MANAGEMENT (3/91)

Weeds in vineyards need to be controlled to enhance the establishment of newly planted vines and the growth and yield of established vines. There are many tools to achieve these objectives, and the methods of using these tools vary from year to year and from vineyard to vineyard.

Weeds reduce vine growth and yields by competing for water, nutrients, and sunlight. Competition is most severe during the first 2 to 3 years of the vine's life or where root growth is limited. Weeds around the vine trunk not only compete directly with vine growth, but provide a good habitat for field mice or voles, which can girdle and kill vines. Gophers are most prevalent in nontilled vineyards and are common where broadleaf weeds predominate. They feed on vine roots and frequently kill young vines. Dry weed growth may become a fire hazard. For optimum yields and vine health, control weed growth, especially in the area around the base of the vine. After about the fourth year, the effect of competition from weeds is somewhat lessened as vines become established and shading from the vine canopy reduces weed growth. Even in older vineyards, weed growth can continue to interfere with cultural practices and harvest. For example, weeds can disrupt the application pattern of water from sprinklers and low volume spray emitters.

Integrated weed management practices vary considerably. Location in the state, climatic conditions, grape varieties, soils, irrigation practices, topography, and grower preferences significantly influence vineyard floor management decisions and the tools used. Weeds are commonly controlled either mechanically or chemically in a 2- to 5-foot wide strip in the vine row. The area between vine rows is mechanically mowed, tilled, or sometimes, chemically treated.

Soil characteristics are important to weed management. The weed species, the number and timing of cultivations required, and the residual effects of herbicides are influenced by soil characteristics. Annual species, such as puncturevine, crabgrass, sandbur, and *Panicum* spp., or perennials like johnsongrass and bermudagrass are more prevalent on light-textured soil while perennials like curly dock and field bindweed are more common on heavier-textured soils. Less preemergent herbicide is required for weed control on sandy, light soils, but residual control may be shorter than on clay or clay loam soils. Low rates of herbicide should be used on sandy soils or those low in organic matter. Clay soils are slower to dry for effective cultivation than sandy loam soils. Thus, more frequent cultivation is practiced on lighter soils than heavy soils.

The irrigation method, amount of water applied, and pattern of rainfall affects the frequency and timing of cultivation as well as the selection of chemicals and their residual activities. Repeat irrigations promote more rapid herbicide degradation in the soil. Herbicide degradation is generally faster under conditions of high rainfall and warm soil compared to low rainfall and cold soil conditions. Degradation is also more rapid under drip emitters or microsprinklers than under furrow irrigation.

Weed management is part of an overall vineyard management system. Plants on the vineyard floor can influence other vineyard pests such as insects, mites, nematodes, and diseases. As an example, bermudagrass, dallisgrass, and many other weed species have been identified as host reservoirs of the Pierce's disease pathogen. This pathogen can be vectored to grapevines by sharpshooter leafhoppers that have fed on host reservoirs. In addition, many species of broadleaf weeds and perennial grasses are hosts to nematodes that also infest grapevines.

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Integrated weed management cont. (3/91)

MONITORING WEEDS: Many different species of summer and winter annual and perennial weeds are found infesting California vineyards. In addition, weeds vary from area to area and year to year within a vineyard. To determine the best control practices, conduct weed surveys at least twice each year: once in late winter and again in late spring or summer to determine the spectrum of weeds present. These surveys are the basis for weed management decisions about herbicide choice or cultivation equipment and practices. Keep written records of survey results noting date and species observed. Use the *Grower's Weed Identification Handbook*, UC ANR Publication 4030, to help identify weeds. Check weed susceptibility tables to determine the best herbicide or combinations of herbicides to use for optimum control of individual weed species.

NONCHEMICAL CONTROLS: Preplant. An especially effective method of weed control before planting vines is to cultivate, then irrigate to germinate new weeds, and cultivate again to destroy seedling weeds. Frequent cultivation lowers weed seed populations in the soil, thus reducing weed growth. At least two cycles of cultivation, irrigation, followed by a shallow cultivation are needed for a marked reduction in weed seedlings. Unfortunately, this method is not effective on established perennial weeds.

A method of control for perennial grasses such as bermudagrass and johnsongrass is to cultivate the soil when it is very dry. Cultivation cuts the rhizomes into small pieces so they can dry out. The soil is reworked frequently using springtooth harrows to pull new rhizomes to the surface and dry them out as well. If the soil is irrigated or rain occurs before total control of the perennial plant is achieved, the rhizome pieces will begin to grow and the effectiveness of this practice is reduced. By the same token, working the soil when wet can increase the population of perennial weeds, because each piece of cut rhizome can root and develop into a new plant.

Field bindweed growth can be reduced for 1 to 2 years by deep plowing or with a reclamation blade (a large V-shaped blade) to cut the roots 16 to 18 inches deep in dry soil. Deep plowing to bury the nutlets of nutsedge to a depth of at least 12 inches will reduce this perennial weed.

Seedlings of perennials can be controlled with repeated cultivations.

Postplant. Weeds can be controlled by hoeing, cultivating, or using weed knives in the vine row and cultivating between the rows. Mechanical cultivators such as a Weed Badger[®] or Lakin[®] plow will be effective if used on loose soil that is not rocky. Mechanical control of weeds must be done repeatedly when weeds are small. If weeds mature, they are difficult to control and interfere with vine training.

Weed growth can be controlled between the rows by repeated mowing or flailing. Planting a cover crop between the rows assures less competitive species and reduces weed growth. Planting a cover crop, the species selected, and their management will differ from one area of the state to another. Cultivation in preparation for planting a winter annual cover crop will also reduce weed growth. To preserve surface cover, mow cover crops no closer than three inches. However, the risk from frost is greater when a cover crop is present unless it is mowed during the period of vine shoot emergence.

Weeds growing in the vine row can be controlled without using herbicides. Synthetic mulches of polyethylene, polypropylene, or polyester can be used around young vines. They enhance relatively uniform moisture conditions, which promotes young vine growth. However, mulches may also provide a good habitat for voles, field mice, and snakes. Weeds near young vines can also be controlled with a french plow (hoe-plow) after the vines are staked.

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Integrated weed management cont. (3/91)

Hoeing is best accomplished when weeds are young; it becomes more difficult when weeds are allowed to get large. Other mechanical tools available for weed control in the vine row include: weed knives, spyder cultivators, and rotary tillers. Disks, tillers, or mowers can be used between the rows. Planted cover crops may also reduce weed growth in the vine row.

HERBICIDES: Properly used herbicides registered for use in vineyards can control most weed species. In most vineyards, combinations and/or sequential applications of herbicides will be required to provide effective, economical control. Before using any herbicide, identify the weed species to be controlled, then read and follow the label directions carefully.

Preemergence (residual) herbicides are used to control weeds before they emerge. Preemergence herbicides such as trifluralin (Treflan), pendimethalin (Prowl), napropamide (Devrinol), and oryzalin (Surflan) are safe to use as a directed spray on young vines. Herbicides used after planting need to be applied before emergence of weeds. They control weeds after seed germination but before emergence. Most preemergence herbicides require rain or sprinkler irrigation to leach them into the soil before they degrade on the surface. Each herbicide has different rates of degradation, but irrigation soon after application enhances weed control. Weeds that emerge while the herbicide is on the surface, before it is activated by rain or irrigation, will not be controlled.

Postemergence herbicides are applied to control weeds already growing in the vineyard. They can be combined with preemergence herbicides or applied as spot treatments during the growing season. In newly planted vineyards, selective postemergence herbicides are available for the control of most annual and perennial grasses, but not broadleaf weeds. Young vines need to be protected from contact by some postemergence sprays. Be sure to check and follow individual label instructions.

In most vineyards, herbicides are used only on a narrow strip of soil centered on the vine row. Thus, the area treated with herbicides is 25 to 33 percent of the total vineyard.

Application equipment must be accurately calibrated to apply the proper amount of herbicide to the soil and young growing weeds. For safe application and to minimize drift, spray equipment should be equipped with a short boom with low pressure (LP) flat fan nozzles. Off center (OC) nozzles are often used on the end of the boom to apply chemicals in the vine row. Some herbicides require special use precautions as indicated in the table below. Always read the entire label before using any pesticides.

For treatment of small areas, especially for perennial weeds, a backpack sprayer or low volume controlled droplet applicator can be used. Extreme care needs to be exercised to avoid drift of herbicides (such as Roundup, Goal, paraquat, and 2,4-D) to vines.

Preplant. Annual and perennial weeds should be controlled before vines are planted. This reduces the competition from weeds during vine establishment. It is especially important to control the perennial weeds field bindweed, johnsongrass, and bermudagrass.

Annual weeds can also be controlled at this time either preemergence or with postemergence herbicides. Trifluralin can be applied and incorporated to a depth of 4 inches into the soil in a 2 to 4 foot wide band prior to planting of the vines. Cuttings or rooted vines can be planted safely if the roots are below this treated soil layer. Short, potted vines should not be planted into soils treated with preplant soil incorporated herbicides because vine stunting can result.

Continued on next page.

Integrated weed management cont. (3/91)

Postplant. Newly planted vineyards. Vines are the most sensitive to weed competition during the first year of growth. They are also more sensitive to some herbicides during this time. Many growers prefer to use preemergence herbicides only after vines have been planted to avoid possible exposure to herbicides. The roots are protected because herbicides are applied to the soil surface and activated with a light irrigation.

Established vineyards. Established vines are more tolerant of many herbicides than newly planted vines. An established vine is usually considered to be at least three years of age under normal growing conditions. For greatest safety, direct herbicides only to the soil or to weed foliage, not to the vine leaves or one- to two-year-old wood.

A preemergence herbicide or combinations of herbicides are used in fall after harvest, split into two applications (fall and spring), or in winter with a postemergence (foliar) herbicide if weeds are present.

Frequently, two or more herbicides need to be applied to obtain adequate weed control. Weed species present will determine which herbicide combinations will provide the most effective control. Read and follow label directions carefully before combining herbicides.

Susceptibility of spring/summer weeds to herbicide control, cont. (11/91)

	HERBICIDES																						
	Preemergence								Postemergence														
	TRI	NAP	OXY	ORY	DIU	SIM	NOR	DIC	PEN	OXY	PAR*	GLY	24D*	FLU	SET	OXY	GLY	PAR*	GLY	SIM	ORY		
PERENNIALS (SEEDLINGS)																							
bermudagrass	C	C	N	C	C	P	C	C	C	C	C	N	N	C	C	C	C	C	C	C	C	C	C
dallisgrass	C	P	N	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
field bindweed	C	P	C	C	N	N	C	P	C	C	C	C	C	C	N	C	C	C	C	C	C	C	C
johnsongrass	C	P	N	C	C	P	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
ESTABLISHED PERENNIALS																							
asparagus	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P
bermudagrass	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
blackberry	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
clover	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
curly dock	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
dallisgrass	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
false																							
dandelion	N	N	N	N	N																		

SUSCEPTIBILITY OF WINTER WEEDS TO HERBICIDES (11/91)

	HERBICIDES																				
	Preemergence								Postemergence												
	TRI	NAP	OXY	ORY	DIU	SIM	NOR	DIC	PEN	OXY	PAR*	GLY	24D*	FLU	SET	OXY	GLY	PAR*	GLY	SIM	ORY
ANNUAL GRASSES																					
annual	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
bluegrass	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
bromegrass	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
canarygrass	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
rabbit-	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
footgrass	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
ryegrass	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
wild barley	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
wild oats	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
ANNUAL BROADLEAVES																					
chickweed	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
clovers	N	P	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
fiddleneck	C	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
filaree	P	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
groundsel	N	P	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
henbit	P	P	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
London rocket	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
minerslettuce	C	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
mustard	N	P	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
nettle	C	C	P	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
pineappleweed	N	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
redmaids	C	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
shepherd's purse	N	P	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
sowthistle	N	C	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C
wild radish	N	P	C	C	C	C	C	C	C	C	C	N	N	N	C	C	C	C	C	C	C

N = no control
 C = control
 P = partial control
 - = no information

TRI = trifluralin (Treflan)
 NAP = napropamide (Devrinol)
 OXY = oxyfluorfen (Goal)
 ORY = oryzalin (Surflan)
 DIU = diuron (Karmex, etc.)

SIM = simazine (Princep)
 NOR = norflurazon (Solicam)
 DIC = dichlobenil (Casoron)
 PEN = pendimethalin (Prowl)
 PAR = paraquat (Gramoxone Extra)*

GLY = glyphosate (Roundup)
 24D = 2,4-D (Envy) *
 FLU = fluazifop (Fusilade 2000)
 SET = sethoxydim (Poast)

*permit required from county agricultural commissioner for purchase or use.

HERBICIDE TREATMENT TABLE: (11/91)

Herbicide (Commercial Name)	Amount to Use (ai/acre)	P.H.I.+ (days)	Comments
PREPLANT			
<i>Preemergence to weed</i>			
A. TRIFLURALIN (Trilin, Treflan 5, Trifluralin 5)	0.75-2 lb		Broadcast preplant incorporated on nonbearing vines. Plant vine roots below treated soil. Do not use more than 1 lb/A on heat treated grape rootings. Do not place treated soil near roots during planting. Residual period: 4-12 months. If a cover crop is to be planted, the higher rate will suppress its growth if trifluralin is applied between rows.
<i>Postemergence to weed</i>			
A. GLYPHOSATE (Roundup)	1-5 lb		Apply with a controlled applicator or with low pressure flat fan nozzles. For annual weed control use 10-40 gallons of water/acre with 1 lb/acre. Apply to young annuals or vigorously growing perennials in flowering stage. Some perennials require the 3.8 lb/acre rate for control. May be used on young weeds in strip followed by planting into the dead weeds. New weeds usually do not establish for a month or more, due to the no-till effect. Do not use more than 10.6 lb/A/year. Residual period: less than 1 month.
POSTPLANT			
<i>Preemergence to weed</i>			
A. TRIFLURALIN (Treflan, etc.)	1-2 lb	60	Nonbearing and bearing vines. Apply as a directed spray and mechanically incorporate to not injure the vine. Residual period: 4-12 months.
B. ORYZALIN (Surflan)	2-6 lb		Nonbearing and bearing dormant vines. Apply to the surface in 20-60 gallons of water/acre. If rain does not occur within 21 days, sprinkle irrigate with 0.5 to 2 inches of water. May be combined with a postemergent herbicide if weeds are present. The higher rates give the longest soil residual. Usually used at 4 lbs/A. Residual period: 6-12 months.

Continued on next page.

+ Preharvest interval. Do not apply within this many days of harvest.

Herbicide treatment table cont. (11/91)

C. NAPROPAMIDE (Devrinol)	4 lb	35	Nonbearing and bearing dormant vines. Apply to the surface in 20-60 gallons of water/acre. Must be incorporated within 7 days of application or sprinkler irrigated. May be combined with a postemergent herbicide if weeds have emerged. Residual period: 4-10 months.
D. OXYFLUORFEN (Goal)	1-2 lb		Bearing dormant vines only. Apply in 20-60 gallons of water/acre on firm soil. Must not be mechanically disturbed or poor weed control will result. Often combined with oryzalin. Check label for use period and cut off dates. Residual period: 4-10 months.
E. PENDIMETHALIN (Prowl)	2-4 lb		For use on dormant nonbearing vines only. Apply in 20 or more gallons of water per acre to soil under vines. Do not apply on newly planted vines unless soil is firm and there are no cracks around base of vines. Best control is achieved when irrigation or rainfall occurs within 7 days. Will not control emerged weeds. Residual period: 4-10 months.
F. DIURON (Karmex, Direx)	3.2 lb or 1.6 + 1.6 lb		Direct to the soil under vines at least 3 years of age. A single application may be made in the winter or split between fall and spring. Do not apply more than 3.2 lb/season. Diuron is sometimes combined with other preemergence herbicides to broaden spectrum of weeds controlled. These combination treatments frequently use lower rates of diuron. Do not apply to vines with trunks less than 1.5 inches in diameter. Note: Pay special attention to soil texture/rate adjustments; do not use on soils with less than 1 percent organic matter. Residual period: 8-12 months.

Continued on next page.

+ Preharvest interval. Do not apply within this many days of harvest.

Herbicide treatment table cont. (11/91)

G. SIMAZINE (Princep)	1-4.8 lb	Apply to the soil under vines older than 3 years anytime between harvest and early spring. Make only one application per year. Use the high rate for heavy soils. Simazine is frequently used in combination with other preemergence herbicides. On light soils, simazine often is used at rates of 0.5 to 1 lb/A. Do not use on gravel, sand, or loamy sand soils. If an irrigation is applied immediately after application, limit water to 0.5 inch. If simazine has been found in groundwater in your area, your area may be designated a Pesticide Monitoring Zone (PMZ), and there may be restrictions on its use. Residual period: 8-12 months.
H. NORFLUORAZON (Solicam)	2-4 lb	Apply to soil as directed spray under vines established for at least 2 years in the fall to early spring. Do not use on coarse textured soils or south of Monterey, Kings, and Tulare counties. Do not use on sandy loam soils after budbreak. Apply in 20-100 gallons of water/acre. Residual period: 6-12 months.
I. DICHLOBENIL (Casoron) 4G	4-6 lb	Apply to the soil under vines that are at least three years of age. For best results, apply and follow with 0.5 to 1 inch of water or an immediate shallow mechanical incorporation. Often causes leaf margin chlorosis. Dichlobenil can be very effective in controlling perennial weeds around sprinkler heads. Residual period: 4-6 months.

Continued on next page.

+ Preharvest interval. Do not apply within this many days of harvest.

Herbicide treatment table cont. (11/91)

Postemergence to weed

A. GLYPHOSATE (Roundup)	1-5 lb	14	Apply with controlled droplet applicator or with low pressure flat fan nozzles. For annual weed control, use 1 lb/A in 10-40 gallons of water. For chemical mowing, consult label for exact timing and rates depending on weed size and species. Apply to young annuals or vigorously growing perennials. Avoid drift onto green canes or foliage to prevent injury.
B. PARAQUAT* (Gramoxone Extra)	0.5-0.94 lb		Apply in 20-60 gallons of water/acre to young weeds. Use 0.5 percent nonionic surfactant. Repeat treatment as new growth occurs. Residual period: less than 1 month.
C. OXYFLUROFEN (Goal)	0.5-1 lb		Dormant application to young (4 leaf stage) weeds. May be combined with other postemergence herbicides for specific weeds.
D. FLUAZIFOP BUTYL (Fusilade 2000)	0.25-0.375 lb		For control of annual and perennial grasses in nonbearing dormant or growing grapes. <u>Do not apply to vines within 1 year of harvest.</u> Apply 20-40 gallons of water/acre and add 0.5 percent nonionic surfactant or crop oil concentrate. Do not apply to grass that is stressed or poor control may result. Repeat applications are required for johnsongrass and bermudagrass. Residual period: less than 1 month.
E. SETHOXYDIM (Poast)	0.28-0.46 lb	50	Nonbearing and bearing vines. Apply to young annual or perennial grasses. Repeat applications will be required for the control of perennial grasses. Add 2 pints of crop oil concentrate to the spray solution. Do not apply to grass that is stressed or poor control may result. Residual period: less than 1 month.

Continued on next page.

* Permit required from county agricultural commissioner for purchase or use.
+ Preharvest interval. Do not apply within this many days of harvest.

Herbicide treatment table cont. (11/91)

F. 2,4-D* (Envy)	1 lb		Established vines only (3 years or older). Apply as a directed spray to weeds, using low pressure flooding nozzles under a hooded boom. Do not allow drift or injury may result. Prohibited in many regions of the state. Residual period: 4-6 weeks.
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Herbicide Combinations:

Combinations are most often used to broaden the weed control spectrum. Perennial weeds will not be controlled with these combinations.

A. GLYPHOSATE (Roundup)	0.5-1 lb	14	For broad spectrum control of emerged weeds in 20-40 gal water/acre/ in dormant grapes. Helps increase control of cheeseweed, filaree, chickweed, and grasses. Glyphosate effectiveness is increased with low water volume and oxyfluorfen is more effective at the higher volume. Avoid drift and follow directions for application period of oxyfluorfen.
...PLUS... OXYFLUORFEN (Goal)	0.1-1 lb		
B. GLYPHOSATE (Roundup)	1 lb	35	Combines post- and preemergence control of most annual weeds with residual control up to 6 months. Combination choice depends on weed spectrum and how rapid incorporation will occur. Napropamide needs irrigation within 7 days, oryzalin within 21 days.
...PLUS... 1. ORYZALIN (Surflan)	4 lb		
...or... 2. NAPROPAMIDE (Devrinol)	4 lb		
C. PARAQUAT* (Gramoxone Extra)	0.5 lb		Broad spectrum postemergence control. Avoid drift and follow directions for application period of oxyfluorfen.
...PLUS... OXYFLUORFEN (Goal)	0.5-1 lb		
D. ORYZALIN (Surflan)	4 lb		Combined to give broad spectrum control. Applied preemergence or combined with paraquat or glyphosate if weeds have emerged. Activate within 21 days.
...PLUS... OXYFLUORFEN (Goal)	1 lb		

Continued on next page.

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+ Preharvest interval. Do not apply within this many days of harvest.

Herbicide treatment table cont. (11/91)

E. SIMAZINE (Princep)	1-2 lb	14	On medium to heavy soils. This combination is effective on a broad range of weed species. Use lower rates on light soils and high rates on heavy, fine-textured soils. Residual period: 8-12 months.
...PLUS...			
DIURON (Karmex)	1-2 lb		
...PLUS...			
GLYPHOSATE (Roundup)	1 lb		

Other combinations can be used depending upon the weed spectrum present in the vineyard.

+ Preharvest interval. Do not apply within this many days of harvest.

PRECAUTIONS FOR USING PESTICIDES

Pesticides are poisonous and must be used with caution. **READ THE LABEL BEFORE OPENING A PESTICIDE CONTAINER.** Follow all label precautions and directions, including requirements for protective equipment. Apply pesticides only on the crops or in the situations listed on the label. Apply pesticides at the rates specified on the label or at lower rates if suggested in this publication. In California, all agricultural uses of pesticides must be reported. Contact your county agricultural commissioner for further details. Laws, regulations, and information concerning pesticides change frequently. This publication reflects legal restrictions current on the date next to each pest's name.

Legal Responsibility. The user is legally responsible for any damage due to misuse of pesticides. Responsibility extends to effects caused by drift, runoff, or residues.

Transportation. Do not ship or carry pesticides together with food or feed in a way that allows contamination of the edible items. Never transport pesticides in a closed passenger vehicle or in a closed cab.

Storage. Keep pesticides in original containers until used. Store them in a locked cabinet, building, or fenced area where they are not accessible to children, unauthorized persons, pets, or livestock. **DO NOT** store pesticides with foods, feed, fertilizers, or other materials that may become contaminated by the pesticides.

Container Disposal. Dispose of empty containers carefully. Never reuse them. Make sure empty containers are not accessible to children or animals. Never dispose of containers where they may contaminate water supplies or natural waterways. Consult your county agricultural commissioner for correct procedures for handling and disposal of large quantities of empty containers.

Protection of Nonpest Animals and Plants. Many pesticides are toxic to useful or desirable animals, including honey bees, natural enemies, fish, domestic animals, and birds. Crops and other plants may also be

damaged by misapplied pesticides. Take precautions to protect nonpest species from direct exposure to pesticides and from contamination due to drift, runoff, or residues. Certain rodenticides may pose a special hazard to animals that eat poisoned rodents.

Posting Treated Fields. For some materials, re-entry intervals are established to protect field workers. Keep workers out of the field for the required time after application and, when required by regulations, post the treated areas with signs indicating the safe re-entry date. Check with your county agricultural commissioner for latest re-entry interval.

Preharvest Intervals. Some materials or rates cannot be used in certain crops within a specified time before harvest. Follow pesticide label instructions and allow the required time between application and harvest.

Permit Requirements. Many pesticides require a permit from the county agricultural commissioner before possession or use. When such materials are recommended, they are marked with an asterisk (*) in the treatment tables or chemical sections of this publication.

Processed Crops. Some processors will not accept a crop treated with certain chemicals. If your crop is going to a processor, be sure to check with the processor before applying a pesticide.

Crop Injury. Certain chemicals may cause injury to crops (phytotoxicity) under certain conditions. Always consult the label for limitations. Before applying any pesticide, take into account the stage of plant development, the soil type and condition, the temperature, moisture, and wind. Injury may also result from the use of incompatible materials.

Personal Safety. Follow label directions carefully. Avoid splashing, spilling, leaks, spray drift, and contamination of clothing. **NEVER** eat, smoke, drink, or chew while using pesticides. Provide for emergency medical care **IN ADVANCE** as required by regulation.

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