TABLE 1. A COMPARISON OF DEVRINOL AND SURFLAN APPLIED FOR ANNUAL GRASSES AND BROADLEAF SPECIES IN STONEFRUIT TREE SPECIES.

Herbicides	Lb./A	Average[1] Weed Control: Lovegrass	Barnyardgrass	Pigweed	Misc. broadleaf weeds
Devrinol	2	7.5	9.5	4.0	6.5
Devrinol	8	9.5	10.0	5.0	8.0
Surflan	2	8.5	10.0	10.0	7.5
Surflan	8	9.5	10.0	10.0	9.0
Untreated	-	2.2	1.0	8.0	1.0

[1]Average of 4. replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete contact. Sprinkler then flood irrigated (basin flood). Treated 4/10/72. Evaluated 5/26/72.

TABLE 2. A COMPARISON OF PREEMERGENCE HERBICIDES FOR WEED CONTROL AND PHYTOTOXICITY TO NEWLY PLANTED GRAPE ROOTINGS AND UNROOTED CUTTINGS.

Herbicides	Lb./A	Weed Control[1]: Grass	Yellow nutsedge	Phytotoxicity[1]: Grape rooting	Grape cutting	Grape vigor
Princep + Devrinol	½ + 4	9.0	1.0	2.0	4.0	7.6
Surflan	4	9.6	0.0	0.3	0.6	5.6
Surflan	16	10.0	2.0	5.3	5.3	6.3
Untreated	-	0.0	2.6	2.0[2]	6.6[2]	1.6[2]

[1]Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill. Treated 3/7/74. Evaluated 5/20/74. Overall grape vigor evaluated 9/12/74.
[2]Severe stunting from weed competition.

DEVRINOL AND SURFLAN:
New Selective Weed Control in Young Orchards

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Annual weed competition in young orchards and vineyards can often reduce first-year growth as much as 50 percent. In fields with extremely heavy weed populations and limited irrigation, trees and vines have been killed by weeds in the first year. Perennial weeds are even more harmful than annual weeds to newly planted trees and vines. Even though a persistent tillage program can give a practical control of perennial grasses, many growers still have serious problems with perennial weeds.

Preplant incorporation of Treflan (trifluralin) has effectively controlled many grass and broadleaf weeds, but the required preplant incorporation does not lend itself well to orchard and vineyards and cannot be properly done in wet soils early in the spring. Occasionally, temporary stunting has occurred when high rates of Treflan-treated soil was used to back fill around the roots of newly planted vines.

Several contact herbicides can be used to control emerged weeds during the growing season. A drawback to contact herbicides is that several timely treatments are needed and the young trees or vines are sometimes injured because of the difficulty of preventing the herbicide from hitting the foliage or bark.

The most practical weed control program is to use residual herbicides immediately after planting the trees

TABLE 4. THE EFFECT OF APPLYING COMBINATIONS OF HERBICIDES ON THE CONTROL OF WINTER ANNUAL WEEDS IN A YOUNG PLUM ORCHARD.

Herbicides	Lb./A	Average[1] Weed Control: Chick weed	Shepherd's purse	Scarlet pimpernel	Red maids	Filaree	Fiddleneck
Princep	1½	10.0	10.0	9.2	10.0	6.5	10.0
Surflan	2						
Princep	1½	10.0	10.0	9.8	10.0	9.5	10.0
Surflan	4						
Princep	1½	10.0	10.0	10.0	10.0	10.0	10.0
Devrinol	4						
Princep	1½	10.0	10.0	10.0	10.0	10.0	10.0
Devrinol	8						
Untreated	-	0.0	0.0	0.0	0.0	0.0	0.0

[1]Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control or kill. There was no phytotoxicity from any treatment. Treated 11/20/74. Evaluated 3/1/75.

TABLE 5. THE EFFECT OF CONTINUOUS USE OF 4 COMBINATIONS OF HERBICIDES ON THE GROWTH OF YOUNG STONE FRUIT TREES AFTER 4 REPEATED ANNUAL TREATMENTS.

Herbicides	Lb./A	Average[1] diameter in centimeters
Princep + Surflan	1 + 4	9.6
Princep + Devrinol	1 + 4	9.6
Princep + Ronstar	1 + 4	10.2
Princep + Solicam[2]	1 + 4	10.3
Untreated	-	9.8
LSD_{05}		N.S

[1]Average of 9 replications of peach, nectarine, apricot, and plum varieties. Herbicides applied 11/7/71, 12/24/71, 3/2/72, 11/1/72, 1/7/73, 2/24/73, 11/3/73, 1/7/74, 2/28/74, 11/7/74, 12/19/74, 1/30/75 to 1/3 of the plots under each treatment were applied Nov., Jan., and Feb. to March each year.
[2]Only 6 replications because only 2 dates of application were used each year: Nov. and Feb.

TABLE 3. THE EFFECT OF 3 YEARS OF HERBICIDE COMBINATIONS ON ANNUAL WEED CONTROL IN AN ALMOND ORCHARD.

Herbicides	Lb./A	Average[1] W/C	Phyto.
Princep + Devrinol	1+4	9.3	0.0
Princep + Devrinol	2+8	8.3	0.0
Surflan + Ronstar	4+4	8.3	0.0
Princep + Surflan	2+4	7.6	0.0
Untreated	-	2.6	0.0

[1]Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Last treatment 12/20/73. Evaluated 9/13/74.

and Vineyards

or vines. Residual herbicides may be applied in a 4- to 6-foot strip down the rows before the weed seeds germinate. Established weeds can be controlled by adding a contact herbicide. It is generally considered more practical to control the weeds down the centers with tillage.

Before Devrinol and Surflan were registered by the state Department of Agriculture, very few preemergence herbicides were available for newly planted non-bearing trees and vines. Both herbicides have been widely tested throughout California's fruit growing areas and offer excellent selective control of most germinating annual and perennial weeds among young trees and vines.

Naturally weed control with either Devrinol or Surflan can be unsatisfactory. Failures have usually been associated with 1) resistant weed species, 2) herbicide loss from volatilization or by an excessive delay between herbicide application and rainfall or irrigation, or 3) treating moist soil and not following with enough water before weeds have germinated. In the absence of rainfall, irrigation water must be applied soon after application or it must be mechanically incorporated to kill germinating weed seeds. In a Hanford sandy loam an initial ¼ inch of sprinkler irrigation has been the minimum amount for adequate incorporation of these herbicides.

Devrinol and Surflan are selective and will not control certain weeds. Combinations of herbicides usually give better weed control. Combinations of Devrinol or Surflan with Princep (simazine) at low rates have produced good season-long weed control with little or no foliage symptoms. Repeated annual applications—for 4 years in one test and longer in others—have caused no problems and in one test Surflan gave control of perennial bindweed. Occasionally, on sandy soils low in organic matter,

TABLE 6. A COMPARISON OF THE EFFECT OF HERBICIDES ON TRUNK DIAMETER AFTER ONE SEASON'S GROWTH OF YOUNG NEWLY PLANTED ORCHARD TREES ON A FLOOD IRRIGATED HANFORD SANDY LOAM.

Herbicides	Lb./A	Percent of Untreated[1] Peach	Almond	Cherry	Apple	Pear	Avg.
Princep	2	187	157	84	89	113	110
Devrinol	2	129	124	48[2]	105	109	103
Devrinol	8	132	124	88	147	122	123
Surflan	2	174	105	116	95	122	122
Surflan	8	177	149	116	105	109	131
Untreated	-	100	100	100	100	100	100

[1]Diameter measured 10 inches above the soil line; average of 4 replications.
[2]Represents a loss of growth because of weed competition and competition with other tree species.

TABLE 7. WEED CONTROL WITH REPEATED ANNUAL HERBICIDE APPLICATIONS IN YOUNG VINEYARDS.

Herbicides	Lb./A	Average[1] Weed Control 3/22/72 Annuals	3/8/73 Annuals	9/6/74 Grass	9/6/74 Broad leaf	6/3/75 Annuals	6/3/75 Bind weed
Princep + Devrinol	2+4	8.4	9.1	9.5	6.0	9.9	0.0
Princep + Devrinol	4+8	7.9	9.9	9.8	6.2	9.9	0.8
Princep + Surflan	2+2	8.9	8.8	4.8	6.2	9.6	7.2
Princep + Surflan	2+4	8.6	9.1	8.8	6.8	8.7	7.0
Princep + Surflan	4+8	8.8	9.5	10.0	8.5	9.9	9.9
Untreated	-	0.0	4.8	1.0	0.5	0.8	0.5

[1]Average of 4 replications. Treatment dates 2/18/72, 12/26/72, 4/9/74, and 1/22/75. Based on 0 to 10 scale where 0 = no effect and 10 = complete control.

Fig. 1. Susceptibility of Weed Species of Devrinol and Surflan as Compared to Princep.

Lb. al/A	Devrinol 4	Devrinol 16	Surflan 2	Surflan 8	Princep 1
annual bluegrass	C	C	C	C	P
barnyardgrass	C	C	C	C	N
burclover	P	C	P	P	C
cheeseweed	P	C	N	C	N
chickweed	C	C	C	C	C
common groundsel	C	C	P	C	C
filaree	P	C	P	C	P
fleabone	N	P	P	C	C
henbit	N	P	C	C	C
knotweed	C	C	P	C	C
nightshade	N	N	N	P	C
sowthistle	C	C	P	C	C
prostrate pigweed	P	C	C	C	C
redroot pigweed	C	C	C	C	C
pineappleweed	C	C	P	C	C
puncturevine	P	C	P	C	P
purslane	C	C	C	C	C
red maids	N	C	P	C	C
ripgutgrass	C	C	C	C	N
shepherds purse	C	C	P	C	C
sow thistle	C	C	P	P	C
foxtail barley	C	C	P	P	P
wild oats	C	C	C	C	P
wild mustard	P	C	P	C	C
field bindweed	N	N	*	*	N

C = controlled at specified rate.
P = partial control.
N = no control at commercial rate.
* = suppression of growth to partial control.

NOTE: This information is the best information that is available from current trials. Further research may change or will add to this list.

some symptoms have resulted from moderate to low rates of Princep, especially under sprinkler irrigation. However, the Princep label does not recommend use on young trees and vines or on soils low in organic matter. High rates of Devrinol applied to soil surface caused no injury to a large variety of young trees tested, even on light soils low in organic matter either under sprinkler or flood irrigation. Very high rates of Surflan (16 pounds/acre) have caused stunting on newly planted vines in sandy soils, whereas stunting has not resulted from normal 2 to 4 pound/acre rates.

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Fig. 2. Control of winter annual weeds down the tree row in a young Merced County almond orchard experiment using 1 lb. Princep plus 4 lbs. ai Devrinol applied in Nov. Photo taken early Feb.

Fig. 3. Control of winter and summer annuals in a young Kern County apple experiment using Princep at 1 lb./A plus 4 lbs. ai. of Surflan. Note untreated plot in background.

Fig. 4. Shows the safety of even high rates of Devrinol on newly planted grapes and weed-free treated area at the end of the growing season.