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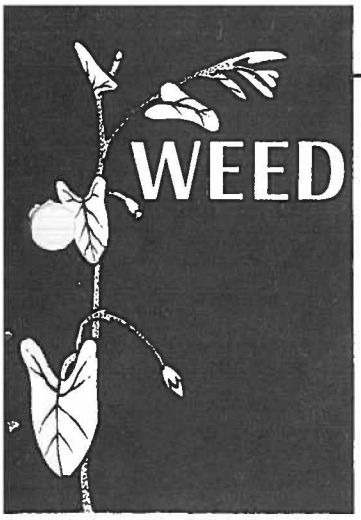

CONTROL NOTES

PROGRESS REPORT

1979
WEED CONTROL
RESEARCH
IN
ALMONDS

Series 79:3

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INTRODUCTION

Integrated pest management in almonds, as in all crops is a popular approach to pest control these days. One of the few sources of federal and state research monies for practical problem solving is now available for work in this area. Along these lines there are researchers and growers who feel that there are advantages to having a ground cover of weeds or crop plants in almond orchards to act as trap crops for insects, for dust reduction and mite control, for water penetration and etc. There are others who feel that a weedy orchard is a weak, low producing orchard and the reasons for being weak are related to the build up of insects, diseases, nematodes and etc. on weeds which are ultimately transferred to almond trees. Some feel complete nontillage with chemical weed control is the ultimate answer to weed control in almond orchards.

It is important to know the interactions of insects, mites, nematodes, diseases, weeds and almond trees. In weed control we have been studying only the interactions between weeds, herbicides and young almond trees. We know that left without weed control, young almond trees will not survive. With partial weed control, we have recorded 50% losses in total tree weight as a result of weeds in the first two years of tree growth. We assume that most of this loss is due to competition for water, however, the foliar condition of young trees heavily infested with weeds are often insect damaged and may be weakened and often killed by weed transmitted diseases. This has not been well documented for almonds, but observations lead us to believe that important interactions are present and need to be studied.

Our present almond research project has been directed at the long term use of herbicides and their effects on almond growth and yield. Our second objective has been the control of perennial weeds in almond orchards.

We have been studying the effect of combinations of herbicides used in strip down the tree row compared to complete chemical weed control, i.e. with no tillage. While we have a number of almond trials with chemical strip weed control with mowed centers this year, we are increasing our studies with the comparison of complete nontillage with and without mowing both in controlled field station trials and in cooperating growers' orchards.

The yield data this year suggests an increase in early yields (as reported last year) where complete nontillage was used. The differences between strip and tillage was probably not significant although strip was slightly higher than tillage in average total yield. Although no long term detrimental effects of the continuous use of herbicides are apparent at this time, it is important to continue evaluating the trends that now appear in the early data. Succeeding years' data will clarify their significance.

The registration of glyphosate (Roundup) for perennial weed control in almonds has been a giant step forward in the control of perennial weeds in almond orchards. The work thus far has indicated good safety for the use of glyphosate in directed sprays in even young established almond orchards. However, more work is needed refining the combination of this excellent postemergence foliar applied herbicide with soil applied herbicides that are capable of working on the weed problem from the soil. Long term residual herbicides effective on the roots of perennials offer an ongoing, continuously soil active program which reduces the number of retreatments with the more expensive foliar sprays and gives additional control of the seedlings of perennials.

Where trifluralin (Treflan) has been incorporated or where oryzalin (Surflan) and several other unregistered herbicides have been rained or irrigated in, additional perennial weed control has been affected. New herbicides being studied for this use in almonds include Eli Lilly's fluridone (Brake), norflurazon (Solicam) by Sandoz, R 40244 manufactured by Stauffer, U. S. Borax's prodiamine (Rydex), Dowco 295 by Dow, Chevron's Ortho 28269 and Fison's NC 20484.

A more detailed discussion of this years' work can be found in the individual write-ups that follow.

Screening new preemergence herbicides for use in almonds. Lange, A. H. and J. T. Schlesselman. Two varieties of young almond trees were planted 3/13/79 and sprinkled in. The varieties were Non-pareil almond on nemaguard 3/8" and Mission almond on nemaguard 5/8".

On 4/4/79 herbicides were mixed in water at 50 gpa and sprayed on with 3-8004 nozzles at 30 psi. The plots were 10' by 21'. The soil is a Hanford fine sandy loam 0.75% organic matter, 59% sand, 33% silt, and 8% clay. X and 4X rates of herbicides were applied to prepared soil. All plots were sprinkler irrigated 4/4/79 and 4/5/79 for 1" of water.

The weed control was evaluated 5/11/79 and 9/24/79 where 0 = no control and 10 = complete control.

The trees were rated for phytotoxicity 6/10/79 and 9/20/79 where 0 = no effect and 10 = complete kill of the tree top.

Most herbicides gave good early weed control showing a rate response. The nutsedge population was as usual variable. MBR 18337 and UBI S-734 were somewhat weaker on broadleaf species and possibly more effective on nutsedge. The late rating showed some resistance of certain weed species.

Ortho 28269 showed selectivity and gave apparent yellow nutsedge control as well as controlling other weeds.

Am.Cy. 213975 was too toxic on almonds but may be safe at lower rates. Fison NC 20484 was also safe and gave good weed control including nutsedge. Dowco 295 gave excellent safety at 2 lb/A and 8 lb/A giving excellent nutsedge control in this and other trials.

Pebulate (Tillam) plus extender did not appear safer than pebulate alone on trees and may have given some phytotoxicity at the high rate.

Most of the herbicides were safe on almonds. Ortho 26197 appeared to be quite toxic showing symptoms somewhat like diuron (Karmex) or simazine (Princep). Fluridone (Brake) showed considerable phytotoxicity symptoms on almonds but did not affect growth extensively.

Table 1. The activity of 18 herbicides on the phytotoxicity of almond varieties (425-73-501-100-1-79).

Herbicides	lb/A	Average Phyto[1] Mission Almond	Average Phyto[1] Non-Pareil Almond	Herbicides	lb/A	Average Phyto[1] Mission Almond	Average Phyto[1] Non-Pareil Almond
Simazine	2	1.3	0.0	Oxyfluorfen +Oryzalin	2+4	0.0	0.0
Simazine+ Oryzalin	1+4	0.0	0.0	Oxyfluorfen +Napropamide	2+4	0.0	0.0
Simazine+ Oryzalin	2+4	2.3	1.3	Oxyfluorfen	2	0.0	0.0
Ortho 26197	1	0.0	0.0	NC 20484	1	0.0	0.0
Ortho 26197	2	0.0	0.0	NC 20484	4	1.0	1.0
Ortho 26197	4	4.3	2.7	Dowco 295	2	0.0	0.0
Ortho 28269	1	0.0	0.0	Dowco 295	8	0.0	0.0
Ortho 28269	2	0.0	0.0	Norflurazon	2	0.0	0.0
Ortho 28269	4	0.0	0.0	Norflurazon	3	0.0	0.0
MBR 18337	1/2	0.0	0.0	Norflurazon	4	0.0	0.0
MBR 18337	2	0.0	0.0	Pebulate	8	0.0	0.0
FPG 225	1/2	0.0	0.0	Pebulate +Extender	8	2.7	4.7
FPG 225	2	2.0	0.3	Glyphosate (preplant)	5 qts.	3.0	2.3
R 40244	1	0.0	0.0	Glyphosate (preplant)	10 qts.	0.0	0.0
R 40244	4	0.0	0.0	Glyphosate (postplant)	10 qts.	0.3	0.3
Am.Cy. 213975	1	0.0	0.0	Weedy Check	-	3.3	3.3
Am.Cy. 213975	2	0.0	0.0	Weedy Check	-	0.0	0.0
Am.Cy. 213975	4	0.0	0.0				
Fluridone	1/2	0.0	0.0				
Fluridone	2	0.0	0.0				
UBI S-734	1/2	0.0	0.0				
UBI S-734	1	3.3	0.0				
UBI S-734	2	0.0	0.0				

1/ Average of 3 replications where 0 = no phyto and 10 = all plants dead. Treated 4/4/79. Evaluated 6/10/79.

Table 2. The activity of 18 herbicides on the vigor of 2 almond varieties (425-73-501-100-1-79).

Herbicides	lb/A	Average Vigor[1] Mission Almond	Average Vigor[1] Non-Pareil Almond	Herbicides	lb/A	Average Vigor[1] Mission Almond	Average Vigor[1] Non-Pareil Almond
Simazine	2	9.3	8.7	Oxyfluorfen +Oryzalin	2+4	9.3	9.3
Simazine +Oyrzalin	1+4	9.0	7.7	Oxyfluorfen +Napropamide	2+4	9.0	8.3
Simazine +Oryzalin	2+4	9.0	8.0	Oxyfluorfen	2	9.0	9.0
Ortho 26197	1	10.0	8.3	NC 20484	1	9.0	6.7
Ortho 26197	2	10.0	9.0	NC 20484	4	8.7	8.7
Ortho 26197	4	7.7	9.0	Dowco 295	2	7.7	7.0
Ortho 28269	1	8.7	8.7	Dowco 295	8	10.0	9.3
Ortho 28269	2	9.0	8.0	Norflurazon	2	10.0	9.7
Ortho 28269	4	9.0	7.7	Norflurazon	3	10.0	10.0
MBR 18337	1/2	7.7	6.3	Norflurazon	4	9.7	8.3
MBR 18337	2	7.7	7.3	Pebulate	8	9.7	8.0
FPG 225	1/2	6.0	6.7	Pebulate +Extender	8	5.7	6.0
FPG 225	2	5.3	5.3	Glyphosate (preplant)	5 qts.	6.0	5.0
R 40244	1	9.3	8.3	Glyphosate (preplant)	10 qts.	7.5	6.3
R 40244	4	8.7	8.0	Glyphosate (postplant)	10 qts.	7.3	5.7
Am.Cy. 213975	1	9.7	9.7	Weedy Check	-	6.3	4.7
Am.Cy. 213975	2	6.7	7.3	Weedy Check	-	9.0	7.3
Am.Cy. 213975	4	9.3	9.0				
Fluridone	1/2	8.7	8.3				
Fluridone	2	7.0	8.3				
UBI S-734	1/2	8.3	7.7				
UBI S-734	1	5.7	7.0				
UBI S-734	2	8.3	7.3				

1/ Average of 3 replications where 0 = no vigor and 10 = most vigorous growth. Treated 4/4/79. Evaluated 9/19/79.

Table 3. The activity of 18 herbicides on several weed species in a deciduous fruit and nut screening trial (425-73-501-100-1-79).

Herbicides	lb/A	Weed Control[1] Tumbling Pigweed	Fiddle-neck	Nutsedge	Other Weeds	Weeds Present[2]
Simazine	2	10.0	10.0	9.0	9.0	PV
Simazine+Oryzalin	1+4	10.0	10.0	8.2	9.0	PV,S
Simazine+Oryzalin	2+4	10.0	10.0	6.2	9.0	PV
Ortho 26197	1	10.0	8.2	9.0	8.0	H,PV,C,G
Ortho 26197	2	10.0	10.0	9.0	9.8	PV
Ortho 26197	4	10.0	10.0	10.0	10.0	
Ortho 28269	1	10.0	6.0	10.0	7.2	R,S,P
Ortho 28269	2	10.0	6.2	10.0	7.0	R,PV,P,S
Ortho 28269	4	9.8	8.8	10.0	7.0	R,PV,S
MBR 18337	1/2	5.8	4.8	9.2	5.8	PV,S,C,R,H,W
MBR 18337	2	9.2	6.8	9.0	8.0	R,PV,P,C
FPG 225	1/2	8.8	10.0	9.0	9.0	PV
FPG 225	2	10.0	10.0	9.0	9.0	S,PV,C,G
R 40244	1	10.0	10.0	9.8	9.2	P,G
R 40244	4	10.0	10.0	9.0	10.0	
Am.Cy. 213975	1	10.0	10.0	4.8	9.2	S
Am.Cy. 213975	2	10.0	10.0	9.2	9.2	PV
Am.Cy. 213975	4	10.0	10.0	8.2	10.0	
Fluridone	1/2	8.2	10.0	10.0	9.0	PV
Fluridone	2	10.0	10.0	6.2	9.8	S
UBI S-734	1/2	5.8	4.8	9.0	7.8	R,S
UBI S-734	1	8.2	6.8	9.2	6.2	R,PV,P
UBI S-734	2	9.2	6.0	10.0	7.2	PV,S,R
Oxyfluorfen+Oryzalin	2+4	10.0	10.0	10.0	10.0	
Oxyfluorfen+Napropamide	2+4	10.0	10.0	6.0	10.0	
Oxyfluorfen	2	10.0	10.0	7.8	10.0	
NC 20484	1	6.2	7.0	10.0	6.0	P,M
NC 20484	4	9.8	9.2	10.0	10.0	
Dowco 295	2	6.0	4.8	9.2	8.2	S,C,M,R
Dowco 295	8	9.8	6.8	10.0	8.8	M,S,PV
Norflurazon	2	10.0	9.2	10.0	8.8	S,R
Norflurazon	3	9.2	9.0	9.0	9.8	PV
Norflurazon	4	10.0	9.8	9.2	8.8	PV
Pebulate	8	9.0	6.8	10.0	6.8	R,S,P
Pebulate+Extender	8	7.8	5.2	8.8	6.0	PV,R,LQ
Glyphosate (preplant)	5 qts.	5.8	3.0	6.2	4.8	R,PV
Glyphosate (preplant)	10 qts.	5.8	5.8	8.2	5.8	C,R,PV
Glyphosate (postplant)	10 qts.	6.2	8.8	5.0	6.2	C,G,R,PV
Weedy Check	-	7.2	5.8	8.2	3.0	R,PV
Weedy Check	-	5.0	3.2	9.2	2.4	

1/ Average of 3 replications where 0 = no control and 10 = complete control. Treated 4/4/79. Evaluated 5/11/79.

2/ Weeds present: B-bermudagrass, C-carpetweed, CG-grabgrass, G-groundsel, H-henbit, LQ-lambsquarter, M-marestail, P-pineapple weed, PV-puncturevine, R-redmaid, S-sowthistle, W-barnyardgrass.

Table 4.
The effectiveness of herbicides in controlling weeds in a deciduous orchard screening trial (425-73-501-100-1-79).

Herbicides	lb/A	Average Weed Control[1/]	Weeds Present[2/]
Simazine	2	6.8	CW,N,P,PV
Simazine+Oryzalin	1+4	5.8	CG,B,PV,F
Simazine+Oryzalin	2+4	7.0	N,PV,CW
Ortho 26197	1	6.3	N,CG,CW,C
Ortho 26197	2	6.8	CW,N,B,P,C,CG,S
Ortho 26197	4	8.8	CW,P
Ortho 28269	1	6.8	P,S,C,PV
Ortho 28269	2	5.0	P,PV,S,N
Ortho 28269	4	7.0	PV,S
MBR 18337	1/2	5.0	P,PV,C,CW,CG
MBR 18337	2	6.8	S,N,C,P,CW
PPG 225	1/2	6.0	P,CW,N,PV,C
PPG 225	2	8.3	N,PV,P,CW
R 40244	1	8.8	P,CW,M,F,PV
R 40244	4	8.3	CW,N,F
Am.Cy. 213975	1	6.8	P,N,S,CW
Am.Cy. 213975	2	6.8	PV,N,CW
Am.Cy. 213975	4	8.0	PV,N,CW
Fluridone	1/2	8.3	N,P,CW,PV
Fluridone	2	8.8	N,P,CW
UBI S-734	1/2	7.3	P,CW,N,S
UBI S-734	1	4.8	PV,P,CW
UBI S-734	2	7.3	CW,S,PV,P,F,N
Oxyfluorfen+Oryzalin	2+4	9.0	P,N,CW
Oxyfluorfen+Napropamide	2+4	8.3	CW,PV,N
Oxyfluorfen	2	8.0	N,S
NC 20484	1	6.0	CW,PV,P,C
NC 20484	4	7.3	CW,P,S,N
Dowco 295	2	6.3	CW,P,S,PV
Dowco 295	8	8.3	P,N,S,CW
Norflurazon	2	8.3	CW,PV
Norflurazon	3	8.3	N,P,S,CW
Norflurazon	4	8.3	S,CW,PV
Pebulate	8	7.0	CW,C,P,N,CG
Pebulate+Extender	8	5.3	PV,CW,P,L
Glyphosate(preplant)	5 qts.	4.3	N,PV,P,C,CW,L
Glyphosate(postplant)	10 qts.	3.8	CW,C,CG,P
Glyphosate(postplant)	10 qts.	4.0	PV,CW,N,P,C
Weedy Check	-	3.8	CW,PV,C,P,N
Weedy Check	-	4.8	S,CW,PV,P

1/ Average of 3 replications where 0 = no control and 10 = complete weed control. Treated 4/4/79. Evaluated 10/1/79.

2/ Weeds present: B-bermudagrass, C-cupgrass, CG-crabgrass, CW-carpetweed, F-fleabane, FN-fiddleneck, L-lambsquarter, M-marestail, N-nutsedge, P-pigweed, PV-punctureveine, S-sowthistle.

Table 5.
Almond and Pistachio Summary trunk diameters (425-73-501-100-1-79).

Herbicides	lb/A	Trunk Diameters (mm)[1/] Non-Pareil Almond	Texas Almond	Pistachio
Simazine	2	26.3	35.5	10.3
Simazine+Oryzalin	1+4	20.6	30.3	8.3
Simazine+Oryzalin	2+4	25.3	31.3	11.0
Ortho 26197	1	25.6	35.0	11.0
Ortho 26197	2	28.6	32.3	11.0
Ortho 26197	4	24.0	29.3	11.6
Ortho 28269	1	30.0	29.3	9.6
Ortho 28269	2	26.0	30.6	8.6
Ortho 28269	4	23.0	31.0	10.6
MBR 18337	1/2	21.3	25.6	8.0
MBR 18337	2	25.3	30.0	12.0
PPG 225	1/2	27.0	31.6	9.3
PPG 225	2	21.6	25.6	15.3
R 42044	1	23.6	31.6	12.6
R 40244	4	24.6	37.0	10.0
Am.Cy. 213975	1	23.6	33.3	11.6
Am.Cy. 213975	2	24.3	26.6	7.3
Am.Cy. 213975	4	27.3	3.63	11.6
Fluridone	1/2	22.3	30.3	9.0
Fluridone	2	27.6	29.0	12.3
UBI S-734	1/2	24.6	28.3	7.3
UBI S-734	1	18.3	31.5	11.6
UBI S-734	2	24.6	28.3	8.3
Oxyfluorfen+Oryzalin	2+4	27.3	33.6	15.0
Oxyfluorfen+Napropamide	2+4	30.3	31.3	13.3
Oxyfluorfen	2	25.6	26.3	10.3
NC 20484	1	23.6	30.0	10.0
NC 20484	4	30.0	30.0	15.0
Dowco 295	2	22.3	25.6	11.6
Dowco 295	8	28.3	35.3	10.6
Norflurazon	2	30.6	30.3	8.0
Norflurazon	3	26.3	34.3	9.3
Norflurazon	4	31.6	35.3	12.0
Pebulate	8	26.6	31.0	10.0
Pebulate+Extender	8	20.0	23.6	9.0
Glyphosate (preplant)	5 qts.	16.0	23.3	10.0
Glyphosate (preplant)	10 qts.	18.3	25.3	7.6
Glyphosate (postplant)	10 qts.	21.3	27.6	10.3
Weedy Check	-	17.6	25.3	10.3
Weedy Check	-	19.3	28.6	10.6

1/ Average of 3 replications. Treated 4/4/79. Evaluated 12/5/79.

Activity of 7 preemergence herbicides on young almond trees. Schlesselman, J. T. and A. H. Lange. First leaf almond trees were planted into Hanford sandy loam soil at the Kearney Field Station, Fresno County during February of 1978. The orchard was under furrow irrigation.

On 4/6/78, 7 preemergence herbicides were applied to single tree plots (20' by 5') replicating them 3 times. The first retreatment occurred on 12/29/78.

Of the herbicides tested, only the use of norflurazon (Solicam) and fluridone (Brake) resulted in the only foliar symptoms. However, these symptoms were limited to some slight chlorosis of the leaves on the lower branches of the tree and apparently had no effect on the growth of the trees.

The results of the weed control rating were quite variable between the herbicides. Fluridone gave the best weed control, but oryzalin (Surflan) and the high rates of norflurazon also showed good activity. Napropamide's (Devrinol) low rating was primarily due to its ineffectiveness on the composites, marestail and fleabane, as well as black nightshade. Oxyfluorfen's (Goal) poor showing was mainly due to its weakness on grasses. Oxadiazon (Ronstar) in the past has shown much better weed control than was observed in this evaluation.

The effect of preemergence herbicides on almonds and annual weed control (425-73-501-100-1-77).

Herbicides	lb/A	Averages Almond Phyto [1]	Trunk Diameter [2] (cm)	Weed Control [3]	Weeds Remaining [4]
Napropamide	4	0.0	8.0	3.2	M,F,NS,CG, W,C
Oryzalin	4	0.0	8.6	7.6	N,M,C,F
Prodiamine	4	0.0	9.6	6.2	M,N,F,WH
Oxyfluorfen	2	0.0	7.5	3.7	CG,M,W,C,F
Oxyfluorfne	4	0.0	9.1	5.0	CG,C,M,W
Norflurazon	2	0.3	8.3	4.8	M,C,WH
Norflurazon	4	0.0	8.8	7.4	C,M,W,F
Norflurazon	8	1.3	7.7	7.5	M,C,PW
Fluridone	1	0.0	9.1	8.1	M,N,C,B
Fluridone	2	0.3	8.0	9.0	M
Oxadiazon	2	0.0	7.3	2.5	M,CG,F,NS, C,W
Oxadiazon	4	0.0	7.2	2.8	M,F,CG,C
Check	-	0.0	6.8	0.5	M,C,F,CG,K, S,NS,W

1/ Average of 3 replications where 0 = no effect and 10 = complete kill. Treated 4/6/78, 12/29/78. Evaluated 7/26/79.
2/ Average of 3 replications. Diameters taken 10/16/79.
3/ Average of 13 replications where 0 = no control and 10 = complete weed control. Treated 4/6/78, 12/29/78. Evaluated 7/26/79.
4/ Weeds remaining: C-cupgrass, CG-crabgrass, B-bermudagrass, F-flaxleaf fleabane, K-knotweed, M-marestail, N-nutsedge, NS-nightshade, W-barnyardgrass, WH-willowherb, PW-pigweed.

The effect of 3 cultural methods on the yield of almond trees. Lange, A. H. and J. T. Schlesselman. The effect of tillage in almond trees has long thought to be detrimental. The obvious destruction of surface roots could be expected to reduce root absorption in the richest horizon of soil. Deep roots are needed for structure and water absorption during periods of low water availability, but the nutrition of trees could be expected to be optimum when the feeder roots are plentiful in the surface soil.

The object of the long term study was to compare yields under complete tillage, strip tillage and nontillage. The trial was started on 2/10/75 right after planting and has been treated annually since.

For the second year of yield data, although the yield are still very small, the difference between herbicide treatments are large, but probably not significant because of the tree to tree variation. However, when all 4 replicates and 5 chemicals are averaged together and compared with 20 replicates of tilled plots, the differences become more believable. In fact, it would appear the strip cultivation doesn't differ much from complete tillage. However, complete nontillage yield was about 30% greater than tillage and strip tillage.

Table 1. The effect of repeat preemergence herbicides on annual weed control in a young orchard (425-73-501-414-2-75).

Herbicides	lb/A	Weed Control [1] Marestail S	Marestail NT [3]	Flaxleaf fleabane S	Flaxleaf fleabane NT	Water-grass S	Water-grass NT	Cup-grass S	Cup-grass NT	Crab-grass S	Crab-grass NT	Nut-sedge S	Nut-sedge NT	Other weeds [2] S	Other weeds [2] NT
Simazine+ Oryzalin	1+4	8.0	9.5	9.0	9.3	9.8	9.8	9.0	9.0	10.0	9.8	7.8	5.5	10.0	10.0
Simazine+ Napropamide	1+4	8.5	6.3	9.5	8.0	10.0	9.5	5.8	4.8	7.5	6.3	9.3	6.3	9.5_{NS}	7.8_{NS}
Oxyfluorfen+ Norflurazon	2+2	7.5	7.5	10.0	9.3	9.8	10.0	7.0	7.6	9.5	9.8	4.5	8.0	10.0	9.3_B
Oxyfluorfen+ Oryzalin	2+4	9.0	9.0	9.8	9.8	10.0	10.0	10.0	10.0	10.0	10.0	8.3	6.0	10.0	10.0
Oxyfluorfen+ Napropamide	2+4	7.3	8.0	9.5	9.5	9.5	9.3	7.0	9.3	8.5	7.5	8.3	5.5	9.5_B	8.8_B
Check (Tillage)	-	3.0		5.0		4.3		0.0		4.0		10.0		10.0	

1/ Average of 4 replications where 0 = no effect and 10 = complete control.
2/ Other weeds: NS-nightshade, B-bermudagrass. Treated 2/10/75, 1/9/76, 12/17/77, 12/28/78. Evaluated 7/16/79.
3/ B-Herbicide on berms, centers disked; NT-Nontillage, complete chemical.

Table 2. The effect of 3 cultural programs including 5 herbicide combinations on almond yields. (A36-73-501-H14-2-75).

Herbicides	lb/A	Almond Yield (gms)[1/] Strip	No Tillage
Simazine+Oryzalin	1+4	1088	742
Simazine+Napropamide	1+4	879	1223
Oxyfluorfen+Norflurazon	2+2	588	1859
Oxyfluorfen+Oryzalin	2+4	1586	2814
Oxyfluorfen+Napropamide	2+4	2080	358
Check (Tillage Only)		990	

1/ Average weight of 4 replications. Treated 2/10/75, 1/9/76, 12/17/76, 12/15/77, 12/28/78. Weights taken 9/21/79.

Table 3. The effect of three cultural methods on the growth of Mission Almonds as shown by trunk diameters (A36-73-501-H14-2-75).

Herbicides	lb/A	Average Trunk Diameter (cm)[1/] Strip	No Tillage
Simazine+Oryzalin	1+4	22.5	21.8
Simazine+Napropamide	1+4	20.6	18.8
Oxyfluorfen+Norflurazon	2+2	19.3	21.5
Oxyfluorfen+Oryzalin	2+4	21.4	21.3
Oxyfluorfen+Napropamide	2+4	19.3	16.8
Check (Tillage only)	-	17.9	

1/ Average of 4 replications (20 for tillage only). Measurements taken 8 inches above ground. Treated 2/10/75, 1/9/76, 12/15/77, 12/28/78, 12/19/79. Measurements taken 12/5/79.

The use of preemergence herbicides alone and in combination for weed control in almonds. Fischer, B. B. and J. T. Schlesselman. On 1/26/76 a herbicide trial was established in an almond orchard under sprinkler irrigation. The soil was a Hanford sandy loam. The plots were 48' long by 10' with 4 replications. All herbicides were reapplied on 1/6/77 and 1/17/78.

Table 1 shows the weed control activity on 1/1/79, nearly 1 year after the 1/17/78 retreatment. Almost all herbicides were displaying outstanding activity on the winter annual weeds.

The latest retreatment occurred on 1/1/79 and a weed control rating was taken after 6 months on 7/3/79 (Table 2). The reduction in weed control activity of the herbicides was primarily due to the resistance of nutsedge, which was quite prevalent in the orchard. Other than the nutsedge, most herbicides were quite active on the summer annual weeds.

No phytotoxicity has been observed to the trees as a result of any herbicide treatment.

Table 1. Activity of several preemergence herbicides on annual weeds in a mature almond orchard (C-61,425,146,10,76,5/425-10-501-146-1-79).

Herbicides	lb/A	Weed Control[1/]	Weeds Present[2/]
Simazine+Oryzalin	1/2+4	9.5	G
Simazine+Napropamide	1/2+4	9.5	B,F,P,G
Simazine+Prodiamine	1/2+2	9.5	P
Prodiamine	4	9.8	P
Prodiamine	8	9.5	P
Oxyfluorfen	2	9.8	G
Oxyfluorfen	4	9.3	C,S,CW,G
Oxyfluorfen	8	10.0	
Oxyfluorfen+Napropamide	2+4	10.0	
Oxyfluorfen+Oryzalin	2+4	9.0	P,S,G
Simazine+Penoxalin	1/2+4	9.8	G
Simazine+Napropamide	1+4	9.5	G,B,CW
Simazine+Oryzalin	1+4	9.3	CW
Simazine+Oxadiazon	1/2+4	8.3	P,R,G,CW,C,F
Check	-	4.3	P,F,CW,C,B,FN,C,R

1/ Average of 4 replications where 0 = no effect and 10 complete weed control. Treated 1/26/76, 1/6/77, 1/17/78. Evaluated 1/1/79.
2/ Weeds present: B-bluegrass, C-chickweed, CW-cudweed, F-filaree, FN-fiddleneck, G-annual grasses, P-evening primorse, R-redmaids, S-shepherd's purse.

Table 2. A comparison of several preemergence herbicides in controlling weeds in a mature almond orchard (C-61,425,146,10,76,5/425-10-501-146-1-79).

Herbicides	lb/A	Weed Control[1/]	Weeds Present[2/]
Simazine+Oryzalin	1/2+4	7.8	N,M,P
Simazine+Napropamide	1/2+4	7.0	N,M,P,B,CG
Simazine+Prodiamine	1/2+2	7.0	N,P,M
Prodiamine	4	7.8	N,P
Prodiamine	8	6.2	P,M
Oxyfluorfen	2	6.2	M,B,P,N
Oxyfluorfen	4	8.2	N,P,C,M
Oxyfluorfen	8	8.8	N,B,M
Oxyfluorfen+Napropamide	2+4	7.5	N,M
Oxyfluorfen+Oryzalin	2+4	8.5	N
Simazine+Penoxalin	1/2+4	8.5	N,M,P
Simazine+Napropamide	1+4	7.2	N,M,CG,P,C
Simazine+Oryzalin	1+4	9.2	N
Simazine+Oxadiazon	1/2+4	6.5	N,B,M,P
Check	-	1.0	P,M,C,N,B

1/ Average of 4 replications where 0 = no effect and 10 = complete control.
2/ Weeds present: B-bermudagrass, C-cudweed, CG-crabgrass, N-nutsedge, M-marestail, P-primrose. Treated 1/26/76, 1/6/77, 1/17/78, 1/5/79. Evaluated 7/3/79.

Puncturevine control in almonds.
Lange, A. H. and J. T. Schlesselman.
A 5 year old almond orchard was treated with 5 preemergence herbicides on 2/14/78. The trees were in a sandy loam soil under furrow irrigation. Plot size was 66' by 10' with 2 replications. The experiment was retreated on 2/8/79. The evaluation for puncturevine control, made on 4/23/79, resulted in oryzalin (Surflan) being by far the most effective (see table). Oxyfluorfen's (Goal) activity on puncturevine was for the most part commercially acceptable (at least 7.0). Norflurazon (Solicam) was the weakest of all the herbicides in controlling puncturevine. Previous studies, however, have resulted in better performance by norflurazon on puncturevine.

No phytotoxicity to these almond trees was observed as a result of these herbicide treatments.

The activity of five preemergence herbicides in controlling puncturevine in a six year old almond orchard (425-10-501-146-7-77).

Herbicide	lb/A	Average[1/] Puncturevine Control
Oxyfluorfen	2	7.0
Oxyfluorfen	4	6.5
Oxyfluorfen	8	7.5
Prodiamine	2	6.0
Prodiamine	4	6.5
Prodiamine	8	6.5
Oryzalin	2	9.0
Oryzalin	4	10.0
Oryzalin	8	9.5
Norflurazon	1	5.0
Norflurazon	2	4.5
Norflurazon	4	4.5
Napropamide	4	5.7

1/ Average of 2 replications where 0 = no effect and 10 = complete control.
Evaluated 7/23/79. Treated 2/14/78, 2/8/79.

Effectiveness of 2 preemergence herbicides in controlling weeds in almonds.
Schlesselman, J. T. and A. H. Lange.
On 1/21/77, oxyfluorfen (Goal) at 1, 2 and 4 lb ai/A and oxadiazon (Ronstar) at 2 and 4 lb ai/A were applied to 48' by 12' plots in a 4 year old almond orchard. The soil was a loamy sand with 83% sand, 14% silt, 3% clay and 0.41% organic matter under sprinkler irrigation.

The plots were retreated on 1/26/78 and oxadiazon was replaced by fluridone (Brake) at 1/2 and 1 lb ai/A.

A weed control rating was taken on 1/12/79 to determine the 2 herbicides effectiveness on winter annual weeds nearly 1 year after the 1/26/78 retreatment. Table 1 shows that both herbicides gave outstanding weed control, even at the low rates. Oxyfluorfen at 4 lb/A was 100% effective on shepherd's purse, redmaids and redstem filaree.

All plots were retreated on 1/12/79.

The latest evaluation taken on 7/20/79 resulted in both oxyfluorfen and fluridone giving excellent summer annual weed control (Table 2). There was an infestation of nutsedge in this almond orchard and the only treatment to give satisfactory control was fluridone at 1 lb/A. However, this rate of fluridone did result in some very slight chlorosis to one of the treated trees, which didn't appear to affect it growth or yield.

Table 1. Activity of two preemergence herbicides on winter annual weeds in an almond orchard (425-10-501-146-4-77).

Herbicides	lb/A	Weed Control 1/	Weeds Present 2/
Oxyfluorfen	1	8.7	S,R
Oxyfluorfen	2	9.0	S,R
Oxyfluorfen	4	10.0	
Fluridone	1/2	9.0	S,R
Fluridone	1	8.0	R,S,F
Check	-	4.0	R,S,F

1/ Average of 3 replications where 0 = no effect and 10 = complete weed control.

2/ Weeds present: S-shepherd's purse, R-redmaids, F-redstem filaree. Treated 1/21/77, 1/26/78. Evaluated 1/12/79.

The use of preemergence herbicides for control of annual weeds in almonds. Vargas, R and A. H. Lange. A study was established in a 12 year old almond orchard in Madera County on 12/7/78 to determine the effect of preemergence herbicides over a prolonged period of time. The trial area was divided into 2-tree, 6.5' by 48' plots and treatments were applied with a CO_2 plot sprayer at 30 PSI with 50 gallons of water per acre. Annual weed control ratings were made on 3/6/79 and 4/12/79. Evaluation indicated very effective annual weed control by all treatments (see table).

No phytotoxicity was observed in the almond trees.

Table 2. The effect of two preemergence herbicides applied to an almond orchard under sprinkler irrigation. (425-10-501-146-4-77).

		Weed Control 1/			
Herbicides	lb/A	Cupgrass	Nutsedge	Other Weeds 2/	Phyto 3/
Oxyfluorfen	1	9.7	5.3	10.0	0.0
Oxyfluorfen	2	8.7	6.0	9.3P	0.0
Oxyfluorfen	4	10.0	5.7	10.0	0.0
Fluridone	1/2	9.3	5.0	10.0	0.0
Fluridone	1	9.7	7.7	10.0	0.3
Check	-	6.0	4.0	9.0L	0.0

1/ Average of 3 replications where 0 = no control and 10 = complete control.

2/ Other weeds: P-puncturevine, L-lambsquarter.

3/ Average of 3 replications where 0 = no effect and 10 = complete kill. Treated 1/21/77, 1/26/78 and 1/12/79. Evaluated 7/20/79.

Comparison of preemergence herbicides used in almonds and their effect on annual weeds after three annual applications. (425-20-501-146-1-77).

Herbicides	lb/A	Annual Weed Control 1/	Weeds Present 2/
Napropamide	4	9.5	G
Oryzalin	4	9.3	F,P,S
Oxyfluorfen	4	10.0	
Prodiamine	4	9.5	P
Norflurazon	2	10.0	
Norflurazon	4	10.0	
Check		2.3	S,G,P,N,L

1/ Average of 4 replications where 0 = no control and 10 = complete control. Treated 11/15/76, 1/4/78 and 12/15/78. Evaluated 3/7/79.

2/ Weeds present: F-filaree, G-common groundsel, L-london rocket, N-fiddleneck, P-pineapple weed, S-shepherd's purse.

The use of preemergence herbicides for control of annual weeds in almonds. Vargas, R and A. H. Lange. A study was established in a 3 year old almond orchard in Madera County on 11/15/76 to determine the effect of preemergence herbicides over a prolonged period of time. Retreatments were on 1/4/78 and 12/15/78. The trial area was divided into 2 tree, 6.5' by 48' plots and treatments were applied with a CO_2 plot sprayer at 30 PSI with 50 gallons of water per acre. Annual weed control ratings were made on 3/7/79. The evaluation indicated that all treatments were doing an excellent job of controlling the annual weeds that were present (see table).

No phytotoxicity to the almonds have been observed to this point.

Comparison of preemergence herbicides used in almonds. (425-20-501-146-6-79).

Herbicides	lb/A	Annual Weed Control[1] 3/6/79	4/12/79
Simazine	2	9.8	10.0
Simazine+Napropamide	1+4	10.0	9.5
Simazine+Oryzalin	1+4	10.0	9.8
Napropamide	4	9.5	8.5
Oryzalin	4	9.0	9.0
Oxyfluorfen	4	10.0	10.0
Prodiamine	4	8.8	7.5
Norflurazon	4	9.8	9.8
Oxyfluorfen+Napropamide	2+4	10.0	10.0
Oxyfluorfen+Oryzalin	2+4	10.0	9.2
Oxyfluorfen+Prodiamine	2+4	10.0	10.0
Oxyfluorfen+Norflurazon	2+4	10.0	10.0
Check	-	0.0	0.0

1/ Average of 4 replications where 0 = no control and 10 = complete control. Treated 11/12/76, 1/4/78, 12/15/78.

Evaluation of oxyfluorfen plus simazine for weed control in almonds. Kempen, H.M. Five oxyfluorfen (Goal) plus simazine (Princep) treatments were applied 11/28/78 to almonds with an AMC sprayer unit at 30 gpa using 8006 plus OC-6 nozzles. Herbicide plots were 10' wide banded in tree row by 1325' replicated 2 times. All treatments were applied with 1/4% Triton AG-98 wetting agent; 2X treatments were applied to the Mission variety. Soil was a loam under sprinkler irrigation. Two rows of the 10 treated were Mission variety, the other variety was Non-Pareil.

A varietal difference was again noted; the Mission variety showed definite phytotoxic reactions to the simazine at 1 lb (plus paraquat at .5 lb). The 2X rate showed more than twice the injury in this treatments. This injury is attributable to the simazine.

Weed control was excellent in all treatments until September harvest time when the last readings were made. Weeds controlled were filaree, marestail, and cheeseweed, a few that were still present around the permanent set spinner heads. The middle untreated areas were composed of 75% puncturevine, 20% fleabane and 5% junglerice.

Evaluation of oxyfluorfen plus simazine for weed control in almonds (Kern County).

		Average[1] Weed Control			Tree Injury	
Herbicides	lb/A	2/6/79	5/2/79	8/29/79	5/2/79	8/29/79
Oxyfluorfen +Simazine	1+1/2	10.0	9.9	10.0	0.0	0.0
Oxyfluorfen +Simazine	1+1	10.0	10.0	10.0	1.0	0.0
Oxyfluorfen +Simazine	2+1/2	10.0	9.9	10.0	0.5	0.0
Oxyfluorfen +Simazine	2+1	10.0	10.0	10.0	0.5	0.0
Simazine +Paraquat[2]	1+1/2	10.0	9.7	10.0	1.0	2.0
Check	-	0.0	0.0	0.0	0.0	0.0

1/ Averages are of 2 replications where 0 = no effect and 10 = complete kill.

2/ A 2X rate was rated 5 for injury on 8/29/79 - the time when injury is most evident. Spider mite injury was equal to or worse than simazine at 2 lb/A but may not cause as much effect in the subsequent season.

The evaluation of 8 preemergence herbicides for the control of winter annuals in a bearing almond orchard. Elmore, C. L., T. M. Aldrich, D. M. Holmberg, A. H. Lange and R. G. Snyder. A Mission and Non-Pareil almond block in the 3rd leaf (bearing) established on an Arbuckle gravelly clay loam soil series was selected for the performance evaluation of 8 preemergence herbicides on winter annual weeds. A drip irrigation system provides water and nutrients for the trees. The trial is located in the Colusa County and University of California Research Orchard on the Nichols Estate in Colusa County. The treatment plots, 10' wide and 24' long were randomly selected within 4 replicated blocks. A CO_2 powered backpack sprayer with a hand held boom was used for the applications. A single performance rating was made on 5/1/79. The 1979 application was the first in this study. All treatments, except one, provided weed control ranging from acceptable to excellent. The exception was the 4 lb/A napropamide (Devrinol) plus 2 lb/A norflurazon (Solicam) combination treatment which did not acceptably control seedling field bindweed.

Annual weed control in almonds

Herbicides	lb/A	Filaree	Burclover	Weed Control 1/ Knotweed	Shepherds-purse	Field Bindweed	Star-thistle
Napropamide	4	8.5	9.0	8.8	7.5	7.8	8.2
Napropamide+Simazine	2+1	9.0	9.5	9.5	9.0	7.0	9.2
Napropamide+Simazine	4+2	8.8	10.0	9.2	8.8	7.5	8.2
Napropamide+Norflurazon	4+2	9.2	9.2	9.5	9.8	6.8	9.5
Norflurazon	2	9.2	10.0	8.2	9.2	9.8	9.2
Norflurazon	4	9.2	9.2	9.0	7.8	8.8	9.2
Norflurazon+Oryzalin	2+2	9.8	9.5	9.2	9.5	9.2	9.0
Oryzalin	4	8.8	9.8	9.2	8.0	7.8	9.0
Oxadiazon	4	9.5	9.5	8.8	9.2	9.0	9.0
Oxyfluorfen	2	10.0	9.5	7.2	7.5	9.0	8.8
Oxyfluorfen	4	9.8	9.8	9.2	8.5	8.5	8.5
Oxyfluorfen+Napropamide	2+2	10.0	10.0	8.2	7.2	9.5	9.5
Oxyfluorfen+Oryzalin	2+2	10.0	10.0	9.2	8.0	8.0	9.2
Prodiamine	4	8.5	9.2	9.5	7.2	8.8	7.8
Prodiamine	2	7.8	9.0	8.2	7.8	9.0	8.0
Prodiamine+Norflurazon	2+2	8.5	9.5	8.8	7.8	9.2	8.2
Fluridone	1	8.2	10.0	8.5	8.2	7.8	7.5
Fluridone	2	9.2	9.8	8.2	9.0	8.2	8.2
Simazine	2	9.5	9.8	9.8	9.0	7.8	9.8
Check	-	7.8	9.2	6.8	6.2	7.8	7.2

1/ Weed control rated 0 = no control and 10 = complete control. Treated 1/17/79. Evaluated 5/1/79. All treatments included Paraquat at 1 lb/A and X-77 at 0.5%.

The evaluation of 4 preemergence herbicides for the control of winter annuals in an established almond orchard. Elmore, C. L., W. H. Olson, A. H. Lange and R. G. Snyder. A mature (bearing) Non-Pareil almond orchard established on a Vina loam soil series was selected for the comparative evaluation of 4 preemergence herbicides applied singularly or in combination for the control of winter annual weed species. The trees were dormant when the treatments were applied. Single tree plots 10' wide and 28' long were randomly selected with the treatments replicated 4 times. The herbicides were applied with a portable CO_2 powered spray apparatus through a hand-held boom. The herbicides were applied with water at the 50 gpa rate. The performance of the herbicides was evaluated by rating control of individual weed species on 5/3/79. All herbicide treatments demonstrated acceptable performance.

Annual Weed Control in Almonds (Butte County)

Herbicides	lb/A	Weed Control 1/ Common Chickweed	Filaree	Annual Bluegrass	Pineapple Weed
Simazine+Napropamide	1+2	8.8	9.2	8.8	8.0
Norflurazon	2	7.0	10.0	8.2	8.2
Norflurazon	4	8.5	9.8	9.5	9.8
Norflurazon+Simazine	2+1	8.0	9.5	8.2	8.5
Norflurazon+Oxyfluorfen	2+2	7.8	10.0	10.0	9.8
Oxyfluorfen+Napropamide	2+2	8.2	10.0	8.2	8.8
Control	-	3.5	7.0	3.8	7.5

1/ Weed control rated at 0 = no control and 10 = complete control. Treated 12/19/78. Evaluated 5/3/79. All treatments included paraquat at 1 lb/A and X-77 at 0.5%.

Evaluation of commerical orchard application at the Kearney Field Station. Schlesselman, J. T. and A. H. Lange. The results of small replicated plots are essential for the development of accurate information. These field tests in the study were closer to the many conditions found in the growers orchards. The weed control was compared in 20 field applications on the Kearney Field Station in a Hanford fine sandy loam soil. The station had about 5" of rainfall from 1/24/79 to 7/24/79. There were 9 major weed species evaluated in those plots.

For the most part simazine (Princep) plus oryzalin (Surflan) gave better weed control than simazine plus napropamide (Devrinol), although the results were comparable for the most part, when evaluated in the middle of summer.

Yellow nutsedge was not controlled and in general tended to flourish when other weeds were removed.

Activity of preemergence herbicides when applied to large areas in various orchard crops as indicated by weed control.

Crop	Herbicides	lb/A	Weed Control[1]	Weeds Remaining[2]
Plums	Simazine+Oryzalin	2+4	8.0	W
Plums	Simazine+Oryzalin	2+4	8.7	W
Plums	Simazine+Nitralin	2+4	8.3	N
Peaches	Simazine+Oryzalin	2+4	8.0	W
Peaches	Simazine+Oryzalin	2+4	9.7	W
Peaches	Simazine+Oryzalin	2+4	9.3	W
Dwarf Peaches	Simazine+Oryzalin	1/2+4	7.0	F,S,W
Peaches+Nectarines				
Berms	Simazine+Napropamide(4F)	1+4	7.0	C,W
	Simazine+Napropamide (50ZWP)	1+4	8.0	C,W
Tilled Centers	Simazine+Napropamide (4F or 50ZWP)	1+4	2.0	C,W,W
Nontilled Centers	Simazine+Napropamide (4F or 50ZWP)	1+4	7.0	C,W,W
Young Figs	Nitralin	4	6.3	W,W
Old Figs	Simazine+Nitralin	1/2+4	7.0	W,W
Cherries	Simazine+Oryzalin	2+4	7.3	W
Pears	Simazine+Oryzalin	2+4	9.7	W
Pistachios	Simazine+Oryzalin	2+4	9.0	W,W
Almonds	Simazine+Oryzalin	2+4	7.0	W
Almonds	Simazine+Oryzalin	1+4	6.0	P,PW,W
Almond	Simazine+Oryzalin	2+4	10.0	
Walnuts	Simazine+Oryzalin	2+4	7.0	W,W,C
	Check	-	0.0	C,CG,F,M,W,P, PW,S,W

1/ Average of 3 replications where 0 = no effect, 10 = complete control.
2/ Weeds remaining: C-cupgrass, CG-crabgrass, F-flaxleaf fleabane, M-marestail, N-nutsedge, P-puncturevine, PW-pigweed, S-spurge, W-watergrass. Treated between 1/24/79, 2/16/79. Evaluated 7/24/79.

The long term use of combinations of preemergence herbicides in almonds. Lange, A. H. and J. T. Schlesselman. Mission and Non-Pareil trees were planted in the spring in 1973 in a Panoche clay loam soil at the West Side Field Station. They were treated in spring and fall annually for 5 years beginning 4/18/74. Foliar symptoms were evaluated 9/18/79, yields were harvested from individual tree plots and averaged.

The results showed excellent weed control, but slight symptoms where simazine (Princep) had been applied. There appeared to be slightly less increase in diameter with simazine than where oxyfluorfen (Goal) was used, however, there was no difference in yield and the differences in diameters were probably not statistically significant.

Table 1. Comparison of preemergence combinations of phytotoxicity of 5 year old almonds and weed control (425-78-501-100-1-74).

Herbicides[1]	lb/A	Phytotoxicity[2] Mission Almond	Phytotoxicity[2] Non-Pareil Almond	Weed Control[3]	Weeds Present[4]
Simazine+Prodiamine	1+4	1.3	0.0	9.8	N
Simazine+Oryzalin	1+4	1.0	0.0	9.4	N,W
Simazine+Napropamide	1+4	0.6	0.4	8.6	W,B
Oxyfluorfen+Norflurazon	2+2	0.3	0.0	8.9	W,B,N
Oxyfluorfen+Napropamide	2+4	0.5	0.0	9.4	W,PL,F,N
Simazine(+Prodiamine)	1(+4)	1.5	0.0	9.8	N
Simazine(+Oryzalin)	1(+4)	1.6	0.0	8.4	W,B,P
Simazine(+Napropamide)	1(+4)	1.0	0.0	8.3	W,B,N
Oxyfluorfen(+Norflurazon)	2(+2)	0.4	0.0	9.4	W,N
Oxyfluorfen(+Napropamide)	2(+4)	0.2	0.0	8.9	W,B
Check	-	0.0	0.0	4.6	W,F,B,PL

1/ Annual treatments began 4/18/74. Fall treatment (Spring treatment).
2/ Average of 5 replications where 0 = no effect, 10 = complete kill. Evaluated 9/13/79.
3/ Average of 10 replications where 0 = no control, 10 = complete weed control.
4/ Weeds present: B-bindweed, F-flaxleaf fleabane, N-nutsedge, P-pigweed, PL-prickly lettuce, W-watergrass.

Table 2. The effect of combinations of preemergence herbicides on the yield of almonds (425-78-501-100-1-74).

Herbicides[2/]	lb/A	Average[1/] Almond Weights (kg) Mission	Non-Pareil	Average[3/]	Fall and Spring
Simazine+Prodiamine	1+4	3.3	3.2	3.2	3.2
Simazine+Oryzalin	1+4	2.5	4.5	3.5	3.7
Simazine+Napropamide	1+4	3.8	3.7	3.8	3.5
Oxyfluorfen+Norflurazon	2+2	2.9	2.7	2.8	3.6
Oxyfluorfen+Napropamide	2+4	3.6	3.7	3.6	3.3
Simazine(+Prodiamine)	1(+4)	2.9	3.4	3.2	-
Simazine(+Oryzalin)	1(+4)	3.3	4.6	3.9	-
Simazine(+Napropamide)	1(+4)	3.7	2.6	3.2	-
Oxyfluorfen(+Norflurazon)	2(+2)	2.5	4.1	4.3	-
Oxyfluorfen(+Napropamide)	2(+4)	3.1	3.7	3.4	-
Check	-	3.2	4.3	3.8	3.8

1/ Average of 4 to 6 replications.
2/ Average of a total of 10 replications. Harvested 9/10/79.
3/ Herbicides applied once per year for 5 years. Winter treatments (Spring treatments).

Table 3. Activity of preemergence herbicide combinations on the growth of 2 almond varieties (425-78-501-100-1-74).

Herbicides	lb/A	Time	Tree Diameters (cm)[1/] Mission[2/]	Non-Pareil[2/]	Average	Average Fall and Spring 1979	1976-1979 Diameter Increase (cm)
Simazine+ Prodiamine	1+4	F	15.2	14.9	15.0	15.2	3.4
Simazine+ Oryzalin	1+4	F	17.0	16.1	16.6	16.6	3.8
Simazine+ Napropamide	1+4	F	15.5	14.4	15.0	15.0	3.5
Oxyfluorfen+ Norflurazon	2+2	F	16.9	15.5	16.2	16.0	4.0
Oxyfluorfen+ Napropamide	2+4	F	15.8	15.3	15.6	15.5	4.0
Simazine (+Prodiamine)	1(+4)	S	15.1	15.5	15 3		
Simazine (+Oryzalin)	1(+4)	S	16.1	16.9	16.5		
Simazine (+Napropamide)	1(+4)	S	15.4	14.7	15.0		
Oxyfluorfen (+Norflurazon)	2(+2)	S	16.1	15.4	15.8		
Oxyfluorfen (+Napropamide)	2(+4)	S	16.9	13.8	15.4		
Check	-		15.5	15.4	15.4	15.4	3.6

1/ Treated annually for 5 years. Winter application (Spring application).
2/ Average of 5 replications. Diameters taken 10/17/79.

Timing norflurazon applications during winter months for bermudagrass control in almonds. Schlesselman, J. T. A. H. Lange and G. Massey.

A herbicide timing trial was established to determine if applying norflurazon (Solicam) at various times during the winter months could affect activity on bermudagrass. Norflurazon at 2, 4 and 6 lb ai/A was applied at 4 to 6 week intervals for 3 timing applications each year beginning 11/18/76. The almond orchard was in loamy sand soil containing 78% sand, 19% silt, 3% clay and 0.48% organic matter under basin (flood) irrigation.

Past evaluations have shown that there were little differences between when the herbicide was applied and the apparent activity on bermudagrass. Any differences were probably a result of such environmental factors as how soon it rained following herbicide application. It is generally accepted that the sooner the rain, the better the effectiveness of the herbicide.

The latest weed control evaluation was taken on 7/20/79 (see table) and resulted in excellent bermudagrass and summer annual weed control with all rates of norflurazon regardless of treatment dates. However, since the checks were relatively weed-free, it is obvious that the grower had sprayed out the plots with glyphosate (Roundup).

No phytotoxicity has been observed to the trees as a result of norflurazon even at 6 lb ai/A for 3 years in this light sandy soil.

The activity of two preemergence herbicides applied at various dates on bermudagrass and annual weeds in almonds (425-10-502-146-2-77).

Herbicides	lb/A	Application[1/] Date	Weed Control[2/] Bermuda grass	Annuals	Weeds Remaining[3/]
Norflurazon	2	1	9.5	9.0	CG,L
Norflurazon	4	1	9.0	9.5	L
Norflurazon	6	1	9.5	10.0	
Norflurazon	2	2	10.0	9.5	CG
Norflurazon	4	2	10.0	10.0	
Norflurazon	6	2	9.8	10.0	
Norflurazon	2	3	9.8	9.5	L
Norflurazon	4	3	9.3	9.5	L
Norflurazon	6	3	9.5	10.0	
Check	-	-	9.0	9.3	C,F,CG

1/ Dates of application: 1-11/18/76, 2/14/78, 1/12/79; 2-12/30/76, 3/16/78, 2/15/79; 3-2/10/77, 4/14/78, 3/21/79.
2/ Average of 4 replications where 0 = no effect, 10 = complete control.
3/ Weeds remaining: CG-cupgrass, C-cheeseweed, F-filaree, L-lovegrass. Evaluated 7/20/79.

The efficacy evaluation of 2 herbicides applied at 3 separate timings in a mature almond orchard. Elmore, C, L., D. M. Holmberg, A. H. Lange and R, G. Snyder. A mature (bearing) Mission, Non-Pareil and NePlus almond orchard was selected for a comparative evaluation of the performance by oxyfluorfen (Goal) vs. oxadiazon (Ronstar) on annual weeds. The orchard was established on an Esparto clay loam soil series and is sprinkler irrigated. December, March and June treatment timings were selected with each application being applied to a separate orchard block. Treatments consisted of oxyfluorfen at 1, 2 and 4 lb/A and oxadiazon at 2 and 4 lb/A. Each application timing block consisted of single tree plots 10' wide and 30' long. Herbicides were applied with water at the 50 gpa rate. Evaluations of weed control were made on 3 dates. Both oxyfluorfen and oxadiazon at 2 and 4 lb/A provided acceptable to excellent year long control of the local weed spectrum. Oxyfluorfen at 1 lb/A was not rated as acceptable. Oxyfluorfen demonstrated greater control of malva than oxadiazon while the reverse was observed for burclover control. Oxyfluorfen was observed to provide greater weed control for a longer period of time than oxadiazon.

Table 1: Almond trial - annual weed control winter application

Yolo County Deseret Farms Madison, CA

Herbicide	Rate	Malva control 1/ 12/12/78	Malva control 1/ 5/24/79	Malva control 1/ 11/28/79	Burclover control 1/ 12/12/78	Burclover control 1/ 5/24/79	Burclover control 1/ 11/28/79	*Filaree control 1/ 5/24/79	*Filaree control 1/ 11/28/79
oxyfluorfen	1	7.5	6.5	4.5	4.5	6.0	3.5	6.5	6.0
oxyfluorfen	2	8.5	8.0	7.8	6.0	7.5	6.2	7.8	7.5
oxyfluorfen	4	9.8	9.8	9.8	6.2	9.2	7.5	9.5	9.2
oxadiazon	2	8.8	7.0	5.0	5.2	8.0	4.8	9.0	7.0
oxadiazon	4	8.5	8.8	7.0	6.2	9.2	6.8	9.8	8.2
control		5.0	3.0	2.1	5.0	2.0	2.0	2.8	4.2

1/ Weed control: 0 = no control; 10 = complete control

* Weed specie not present during other evaluation

Treatment Date: December 12, 1978

All treatments (including control) received paraquat at 1 #/A and X-77 at 0.5%

Trial 1A: Almond trial - annual weed control winter application (cont.)

Herbicide	Rate	Annual peppercrest control 1/ 12/12/78	Annual peppercrest control 1/ 5/24/79	Annual peppercrest control 1/ 11/28/79	*Wild barley control 1/ 5/24/79	*Wild barley control 1/ 11/28/79	Common chickweed control 1/ 12/12/78	Common chickweed control 1/ 11/28/79
oxyfluorfen	1	5.0	5.8	2.8	6.2	3.8	10.0	6.0
oxyfluorfen	2	6.5	7.8	5.8	7.0	6.0	10.0	8.2
oxyfluorfen	4	7.5	10.0	6.8	10.0	7.0	10.0	8.0
oxadiazon	2	5.5	9.0	4.5	9.8	5.8	9.0	4.5
oxadiazon	4	6.5	9.0	6.0	9.8	7.0	9.0	5.0
control		5.2	3.2	1.8	3.2	2.0	10.0	4.0

1/ Weed control: 0 = no control; 10 = complete control

* Weed species not present during other evaluations

Treatment date: December 12, 1978

All treatments received paraquat at 1 #/A and X-77 at 0.5%

Table 2: Almond trial - annual weed control spring application

Yolo County Deseret Farms Madison, CA

Herbicide	Rate	Malva control 1/ 12/12/78	Malva control 1/ 4/24/79	Malva control 1/ 11/28/79	Burclover control 1/ 12/12/79	Burclover control 1/ 5/25/79	Burclover control 1/ 11/28/79	Filaree control 1/ 5/24/79	Filaree control 1/ 5/25/79	Filaree control 1/ 11/28/79
oxyfluorfen	1	6.5	6.0	5.8	5.5	6.0	5.5	6.5	5.8	6.5
oxyfluorfen	2	8.8	8.8	7.5	7.5	8.0	6.2	8.5	7.8	7.8
oxyfluorfen	4	8.8	9.8	9.5	7.2	9.8	7.8	8.5	10.0	9.2
oxadiazon	2	7.5	6.8	5.0	6.5	8.2	4.8	6.5	8.0	5.5
oxadiazon	4	9.8	8.8	8.0	7.8	9.2	6.8	9.0	9.8	8.8
control		4.8	4.0	2.2	5.0	3.2	1.8	5.2	4.8	3.8

1/ Weed control: 0 = no control; 10 = complete control

Treatment date: April 3, 1979

All treatments received paraquat at 1 #/A and X-77 at 0.5%

Table 2A: Almond trial - annual weed control spring application (cont.)

Yolo County Deseret Farms Madison, CA

Herbicide	Rate	Annual peppercrest control 1/ 12/12/78	Annual peppercrest control 1/ 5/24/79	Annual peppercrest control 1/ 11/28/79	*Wild barley control 1/ 5/24/79	*Wild barley control 1/ 11/28/79	Common chickweed control 1/ 11/28/79
oxyfluorfen	1	6.2	6.2	4.2	6.2	5.0	6.2
oxyfluorfen	2	7.8	7.5	6.2	8.0	6.5	7.5
oxyfluorfen	4	7.8	9.2	7.8	9.2	7.8	9.0
oxadiazon	2	7.0	8.0	5.0	8.5	4.5	4.8
oxadiazon	4	7.8	9.2	6.5	9.5	7.2	6.2
control		5.2	4.0	0.8	3.5	1.2	3.5

1/ Weed control: 0 = no control; 10 = complete control

* Weed species not present during other evaluations

Treatment date: April 3, 1979

All treatments received paraquat at 1 #/A and X-77 at 0.5%

Table 3: Almond trial - annual weed control summer application

Yolo County Deseret Farms Madison, CA

Herbicide	Rate	*Malva control 1/ 12/12/78	5/24/79	*Burclover control 1/ 12/12/78	5/24/79	*Filaree control 1/ 12/12/78	5/24/79
oxyfluorfen	1	6.2	4.0	5.2	4.5	5.8	5.2
oxyfluorfen	2	9.0	6.8	5.8	7.0	7.0	7.0
oxyfluorfen	4	8.8	7.8	7.0	7.2	8.0	7.2
oxadiazon	2	6.2	5.8	5.8	6.2	6.5	7.5
oxadiazon	6	8.5	6.8	6.5	7.2	7.0	7.8
control		5.0	2.5	4.8	2.5	5.0	3.2

1/ Weed control: 0 = no control; 10 = complete control

* Weed species not rated during other evaluations

Trial not treated due to insufficient irrigation water for incorporation in 1979

Table 3A: Almond trial - annual weed control summer application (cont.)

Yolo County Deseret Farms Madison, CA

Herbicide	Rate	*Annual peppercrest control 1/ 12/12/78	5/24/79	*Wild barley control 1/ 5/24/79
oxyfluorfen	1	6.5	3.8	5.2
oxyfluorfen	2	6.5	6.5	5.8
oxyfluorfen	4	7.5	7.0	6.5
oxadiazon	2	6.2	7.2	7.8
oxadiazon	4	7.0	7.5	8.8
control		4.5	3.0	3.5

1/ Weed control: 0 = no control; 10 = complete control

* Weed species not rated during other evaluations

Trial not treated due to insufficient irrigation water for incorporation in 1979

Water requirements for activation of oxyfluorfen. Schlesselman, J. T. and A. H. Lange. The amount of irrigation or rainfall for herbicide activation is prerequisite to understanding preemergence herbicide useage. Oxyfluorfen (Goal) is a new herbicide which has early post- and preemergence activity. Used preemergence, it controls most weed species when adequate water is applied or falls soon after application. The objective of this experiment is to determine the optimum amount of water for activation in a Hanford fine sandy loam.

On 7/18/78, cotton and milo were planted and the oxyfluorfen was applied to newly prepared ground in 5' by 5' plots. Immediately following 1/8", 1/2" and 2" of water were applied with an automatic rain simulator. The experimental design was a split randomized block experiment with water levels being the main plots replicated 3 times and herbicide rates being replicated 9 times.

Weed control was excellent at all rates and irrigation levels when evaluated 10/13/78. There was a slight indication that the weed control was not quite as good at the 1/8" water level as at 1/2" and 2". The cotton crop again suggested less injury from the 1/8" water application but the milo seemed to suggest the opposite. The grass family is less sensitive to oxyfluorfen than the broadleaf but in this experiment the opposite seemed true from the 8/27/78 evaluation.

The cotton reevaluated 9/8/78 clearly showed less damage at the 1/8" level of irrigation than the greater amounts of water. The fresh weights clearly showed less injury from 1/8" water. Only the 4 lb ai/A rate damaged cotton at the 1/8" level, where as 2 lb/A may have caused reduction at other water levels. Milo was more severely affected than cotton, but in general there was less injury with 1/8" than at 1/2" but probably less at 2" than at 1/2" or 1/8" suggesting the possibility of more vertical movement or more beneficial effects on growth as seen in the check. There was also more compaction at the 2" level of water which reduced cotton growth and weed growth thereby resulting in less competition for the milo.

The long term residual activity was evaluated by reseeding 7/16/79. The plots had only seasonal rainfall which amounted to 10 1/2". Under the conditions of the experiment the residual

activity was significant 1 year after application at all levels of irrigation and herbicide useage as seen by the effect on sugar beets, annual grass and pigweed. The amount of activity at 1 lb/A was probably not significant in most cases. These studies, however, suggest further consideration of residual activity when oxyfluorfen is not disturbed as in an orchard or vineyard situation.

Table 1. The effect of initial irrigation on the activity of oxyfluorfen in a Hanford fine sandy loam as measured with cotton and milo. (425-73-506-2-78).

		Average[1/]					
		1/8"		1/2"		2"	
Herbicides	lb/A	Cotton	Milo	Cotton	Milo	Cotton	Milo
Oxyfluorfen	1	8.3	2.3	5.3	5.0	6.7	5.3
Oxyfluorfen	2	7.0	1.7	5.7	1.0	6.3	3.7
Oxyfluorfen	4	6.0	0.0	3.7	0.0	5.0	0.3
Check	-	8.3	8.7	5.7	8.3	5.0	8.3

1/ Average of 3 replications where 0 = no stand and no plants, 10 = largest plants and best stand. Treated and initial irrigation: 7/18/78; seeded and uniform irrigation: 8/18/78; evaluated 8/27/78.

Table 2. The effect of initial amount of irrigation on the activity of oxyfluorfen using cotton (425-73-506-2-78).

		Ave. Phyto Rating[1/]		
Herbicides	lb/A	1/8"	1/2"	2"
Oxyfluorfen	1	2.7	4.3	3.7
Oxyfluorfen	2	4.3	5.3	5.3
Oxyfluorfen	4	7.3	8.0	8.0
Check	-	0.7	1.3	0.3

1/ Average of 3 replications where 0 = no effect and 10 = complete kill of plant. Treated 7/18/78. Evaluated 9/8/78.

Table 3. The effect of initial irrigation on the activity of oxyfluorfen in a Hanford fine sandy loam as measured by weed control (425-73-506-2-78).

		Average Weed Control Ratings[1/]					
		1/8"		1/2"		2"	
Herbicides	lb/A	Fiddle neck	All Other Weeds	Fiddle neck	All Other Weeds	Fiddle neck	All Other Weeds
Oxyfluorfen	1	9.7	9.3	10.0	10.0	9.3	9.7
Oxyfluorfen	2	9.3	9.7	10.0	10.0	10.0	10.0
Oxyfluorfen	4	10.0	9.7	10.0	10.0	6.0	10.0
Check	-	2.7	4.0	4.7	5.0	10.0	7.0

1/ Average of 3 replications where 0 = no effect and 10 = complete weed control. Treated and initial irrigation 7/13/78. Seeded and uniform irrigation 8/18/78. Evaluated 10/13/78.

Table 4. The effect of initial irrigation on the phytotoxicity of oxyfluorfen to cotton and milo (425-73-506-2-78).

		Average Fresh Weights[1/]					
		Cotton			Milo		
Herbicides	lb/A	1/8"	1/2"	2"	1/8"	1/2"	2"
Oxyfluorfen	1	164	125	99	89	117	117
Oxyfluorfen	2	107	92	78	45	17	91
Oxyfluorfen	4	45	23	24	2	0	0
Check	-	106	111	75	421	443	515

1/ Average of 3 replications weight measured in grams per 2' of row. Treated 7/18/78. Evaluated 10/20/78.

Table 5. The effect of initial irrigation on the phytotoxicity of oxyfluorfen on cotton and cantaloupe. (425-73-506-2-78).

		Phytotoxicity[1/]					
		Cotton			Cantaloupe		
Herbicides	lb/A	1/8"	1/2"	2"	1/8"	1/2"	2"
Oxyfluorfen	1	2.3	2.3	6.3	1.7	4.3	5.7
Oxyfluorfen	2	4.3	4.0	3.7	6.0	4.7	5.0
Oxyfluorfen	4	5.0	5.7	3.7	7.0	8.0	7.0
Check	-	2.0	1.0	2.3	1.7	1.7	4.0

1/ Average of 3 replications where 0 = no effect and 10 = complete kill of plants. Treated 7/18/78. Reseeded 7/16/79. Evaluated 8/15/79.

Table 6. The effect of initial irrigation on the phytotoxicity of oxyfluorfen on tomatoes and sugar beets. (425-73-506-2-78).

		Phytotoxicity[1/]					
		Tomatoes			Sugar Beets		
Herbicides	lb/A	1/8"	1/2"	2"	1/8"	1/2"	2"
Oxyfluorfen	1	8.3	4.7	6.7	7.0	6.0	7.7
Oxyfluorfen	2	7.3	7.7	7.0	7.7	7.0	6.0
Oxyfluorfen	4	9.3	9.3	9.7	8.3	9.3	8.7
Check	-	5.0	5.3	7.3	3.7	2.3	4.3

1/ Average of 3 replications where 0 = no effect and 10 = complete kill of plants. Treated 7/18/78. Reseeded 7/16/79. Evaluated 8/15/79.

Table 7. Activity of oxyfluorfen under varying levels of initial irrigation as shown by weed control (425-73-506-2-78).

		Weed Control[1/]					
		Grass[2/]			Tumbling Pigweed		
Herbicides	lb/A	1/8"	1/2"	2"	1/8"	1/2"	2"
Oxyfluorfen	1	6.0	7.3	7.3	5.7	7.3	6.0
Oxyfluorfen	2	8.0	7.7	9.3	8.7	9.3	8.3
Oxyfluorfen	4	9.7	10.0	10.0	10.0	10.0	9.3
Check	-	1.3	2.3	4.3	4.0	2.7	4.7

1/ Average of 3 replications where 0 = no effect and 10 = complete weed control. Treated 7/18/78. Evaluated 8/15/79.
2/ Crabgrass (45%), Cupgrass (40%), Junglerice Grass (15%).

Table 8. Comparison of varying levels of initial irrigation on the activity of oxyfluorfen after 14 1/2 months as shown by the fresh weights of cotton and cantaloupes (425-73-506-2-78).

		Fresh Weight (grams)[1/]					
		Cotton			Cantaloupe		
Herbicides	lb/A	1/8"	1/2"	2"	1/8"	1/2"	2"
Oxyfluorfen	1	541	977	363	4436	2377	1453
Oxyfluorfen	2	1167	533	567	1620	2088	2863
Oxyfluorfen	4	1090	896	1090	2003	107	1493
Check	-	267	487	333	1190	1171	1833

1/ Average of 3 replications. Treated 7/18/78. Reseeded 7/16/79. Weights taken 10/3/79.

Varietal response to preemergence herbicides. Lange, A. H. and J. T. Schlesselman. Varietal response to herbicides have been seen in the response of Mission variety of almonds to simazine (Princep) and Ruby Cabernet to the same herbicide when used under highly alkaline conditions. We cannot assume that because one or two varieties respond the same to an herbicide or even a change in cultural practice that all varieties will follow suit. The object of this trial was two-fold. One was to determine the effect of 2 methods of irrigation drip vs. furrow, on the growth and yield of almonds. The second was to compare herbicide treatments to see if any one variety reacts differently to continuous use of the same herbicide.

The trial was planted 2/8/77 in a close planting in order to conserve space. It has been treated annually: 3/29/77, 1/3/78, and 12/28/78. The heavy rains in the spring of 1978 caused excessive chlorosis from norflurazon (Solicam) the effects of which carried over into 1979 in the foliage symptoms. Even though some trees were severely affected, they did not greatly affect yield in 1979. A more significant effect is expected in the 1980 yields. Although differences due to irrigation were not significant, the 5 out of 6 varieties showed an apparently higher figure for drip than furrow irrigation. More years of yield data will be necessary in order to determine the real differences between irrigation treatments, between varieties and between herbicide treatments.

Table 1. The activity of four herbicide combinations on weeds in an orchard under drip vs. furrow irrigation (425-73-501-146-1-77).

		Drip		Furrow	
Herbicides	lb/A	Weed Control[1/]	Weeds Remaining[2/]	Weed Control[1/]	Weeds Remaining[2/]
Simazine+Napropamide	1+4	5.4	M,F,N,C,CW	5.0	N,C,M,F,P,S
Simazine+Oryzalin	1+4	6.2	F,N,M,CW	6.0	N,F,M
Simazine+Prodiamine	1+4	6.5	F,N,M	6.2	M,M,F
Simazine+Norflurazon	1+2	6.3	F,M,CW,N,C,PW	6.2	N,C,M,F,P,S

1/ Average of 32 replications where 0 = no effect and 10 = complete control. Treated 3/29/77, 1/3/78, 12/28/78. Evaluated 7/27/79.
2/ Weeds remaining: C-cupgrass, CW-cudweed, F-flaxleaf fleabane, M-marestail, N-nutsedge, P-puncturevine, PW-pigweed, S-sowthistle.

Table 2. The effect of 4 herbicide combinations on 6 almond varieties under drip vs. furrow irrigation as shown by almond yield (425-73-501-146-1-77).

		Almond Yield per Tree (Kg)[1]													
		Non-Pareil (8/21)	[2]	Thompson (8/21)		NePlus (9/14)		Peerless (9/14)		Texas (9/18)		Merced (9/18)		Ave. all Varieties	
	lb/A	D	F	D	F	D	F	D	F	D	F	D	F	D	F
Simazine+ Napropamide	1+4	1.1	0.9	5.6	4.3	1.5	1.0	1.7	0.8	1.6	2.6	2.6	2.2	2.7	2.0
Simazine+ Oryzalin	1+4	0.9	1.2	2.3	9.1	1.9	1.6	1.8	0.8	5.2	5.7	2.3	1.6	2.7	3.3
Simazine+ Prodiamine	1+4	1.4	1.3	5.7	6.3	1.4	1.6	3.1	1.9	5.6	4.6	3.9	1.7	3.5	2.9
Simazine+ Norflurazon	1+4	1.4	0.8	2.2	7.2	0.9	0.3	1.4	0.9	3.5	1.6	2.4	2.6	2.6	2.2
Average all Herbicides		1.2	1.1	4.0	6.7	1.4	1.1	2.0	1.1	4.5	3.7	2.8	2.0	2.6	2.6

1/ Average weight in Kg of 4 replications. Treated 3/29/77, 1/3/78, 12/28/78. Prior to 12/28/78 treatment, no simazein used: Oxadiazon at 2 lb. was used with treatments containing napropamide and oryzalin; oxyfluorfen at 2 lb. was used with treatments containing prodiamind and norflurazon.
2/ D-Drip irrigation, F-Furrow irrigation.

Table 3. The effect of 4 herbicide combinations on almonds and pistachios under furrow and drip irrigation as measured by trunk diameter (425-73-501-146-1-77).

		Average trunk diameter as measured in cm.[1]											
		NePlus	[2]	Peerless		Texas		Thompson		Merced		Non-Pareil	
Herbicides	lb/A	D	F	D	F	D	F	D	F	D	F	D	F
Simazine+ Napropamide	1+4	7.8	6.9	8.1	8.1	9.8	9.9	8.9	8.9	9.9	9.4	9.4	9.2
Simazine+ Oryzalin	1+4	8.4	8.5	8.4	8.1	10.8	11.2	7.9	8.9	9.6	9.1	9.5	9.4
Simazine+ Prodiamine	1+4	8.4	8.6	8.9	8.1	10.7	10.4	10.0	8.8	9.8	9.4	8.8	8.9
Simazine+ Norflurazon	1+4	8.4	7.7	7.6	7.1	8.2	9.5	8.1	8.9	10.5	9.2	8.8	7.5
AVERAGE		8.2	7.9	8.2	7.8	9.9	10.0	8.7	8.9	10.0	9.3	9.1	8.8

1/ Average of 4 replications. Measurements taken 10-12 cm. above ground.
2/ D-Drip irrigation, F-Furrow irrigation.
Treated 3/29/77, 1/3/78, 12/28/78. Evaluated 10/17/79.

Simulating herbicide injection through drip emitters in young almond and pistachio trees. Schlesselman, J. T. and A. H. Lange. First leaf Mission almonds and pistachio rootstocks were planted in a sand culture inside 30L cement pots during March of 1979. The trees were irrigated with a drip system. one emitter per pot. On 7/6/79 a 10L suspension of 5 herbicides at 20 ppm each was used to treat both almonds and pistachios, replicated 4 times.

An evaluation on 8/15/79 showed only norflurazon (Solicam) injurying the trees (Table 1). The pistachios reflected less tolerance to the norflurazon than did the almonds.

The weed control rating resulted in only napropamide (Devrinol) showing comparatively poor activity on spotted spurge; by far the dominant weed species in the test.

All herbicides, except norflurazon, were reapplied on 9/18/79. The most recent evaluation (10/11/79) indicated no effect on the trees by the reapplication of napropamide, oryzalin (Surflan), oxadiazon (Ronstar), oxyfluorfen (Goal). Table 2 shows the carryover from the single 20 ppm application of norflurazon was still evident in the almonds, but with the trees recovering somewhat. However, the phytotoxicity to the pistachios had increased to the point where 2 of the 4 trees will probably not recover.

Table 1. The effect of treating young almond and pistachio trees growing in a sand culture (425-73-506-145-1-79).

		Phytotoxicity[1]			
Herbicides[4]	PPM	Almond	Pistachio	Weed Control[2]	Weeds Present[3]
Napropamide	20	0.0	0.0	5.7	S
Oryzalin	20	0.0	0.0	9.3	S,N
Oxadiazon	20	0.0	0.0	8.8	S,CG
Oxyfluorfen	20	0.0	0.5	9.7	S
Norflurazon	20	3.5	7.5	9.2	S,L
Check	-	0.0	0.0	2.7	S,CG,L

1/ Average phyto of 4 replications where 0 = no effect and 10 = complete kill of tree. Treated 7/6/79. Evaluated 8/15/79.
2/ Average of 8 replications where 0 = no control and 10 = complete weed control.
3/ Weeds present: S-spotted spurge, CG-crabgrass, L-lambsquarter.
4/ Herbicides added in suspension.

Table 2. Activity of 5 herbicides on young almond and pistachio trees planted in a sand culture (425-73-506-145-1-79).

		Phytotoxicity[1]	
Herbicides[2]	PPM	Almonds	Pistachios
Napropamide	20+20	0.0	0.0
Oryzalin	20+20	0.0	0.0
Oxadiazon	20+20	0.0	0.0
Oxyfluorfen	20+20	0.0	0.0
Norflurazon	20+0	2.0	8.4
Check	-	0.0	0.0

1/ Average of 4 replications where 0 = no effect and 10 = complete kill of tree. Evaluated 10/11/79.
2/ Herbicides added in suspension. Treated 7/6/79 and 9/18/79 (except norflurazon).

The effect of trunk spraying with 3 postemergence herbicides. Schlesselman, J. T. and A. H. Lange. Injury to the trunks of young trees has been reported for most postemergence herbicides including 3 in this test. Usually such injury has been traced to hand wand application to very young trees. Several trials with almonds have shown injury from the application of MSMA (Bueno 6) to the trunks of young trees. Injury to the trunks of a number of trees has resulted in spraying the lower branches of stone fruit trees but not the suckers. The objective of this study was to determine if long term use of these herbicides at elevated rates would cause injury to the trunks of young established trees.

The trees in this test were treated with glyphosate (Roundup) on 5/5/77, 9/21/77, 9/11/78 and 5/15/79; dinoseb (Dow General) was applied 5/15/79. MSMA at 8 and 16 lb ai/A was applied 5/5/77, 9/21/77, 9/11/78 and 5/15/79.

The results of continuous spraying of these tree trunks has caused no injury of 2 ages of young almond trees. Glyphosate was also applied in this year's screening trial when the trees were in the ground one month and at a second period when leafed out. The applications were to 2 varieties, Non-Pareil and Mission, and no injury occurred at the rates of 5 and 10 lb ai/A. So young almonds do not appear to be overly sensitive to glyphosate spray on the bark of young trees.

The effect of herbicide sprays on the trunks of almond trees (425-73-502-100-1-77).

Herbicides	lb/A	Average Vigor[1] 3 year old trees	Average Vigor[1] 5 year old trees	Phyto to Trunks[2] 3 year old trees	Phyto to Trunks[2] 5 year old trees
Glyphosate	2	7.3	7.7	0.0	0.0
Glyphosate	4	9.7	8.7	0.3	0.0
Glyphosate	8	9.3	9.3	1.3	0.0
Glyphosate	16	9.0	8.7	0.7	0.0
Dinoseb	4	-	8.7	-	0.0
Dinoseb	8	6.7	8.0	3.3	0.0
Dinoseb	16	5.3	8.3	0.0	0.0
MSMA	4	-	8.3	-	0.0
MSMA	8	7.3	9.3	4.7	0.0
MSMA	16	3.7	8.7	6.5	0.0
Check	-	8.3	8.0	0.0	0.0

1/ Average of 3 replications where 0 = no growth and 10 = most vigorous growth.
2/ Average of 3 replications where 0 = no effect, 3 = oozing bark only, 5 = objectionable cracking, 10 = complete tree girdle.

The effect of late spring trunk sprays on newly planted Non-Pareil almond trees. Schlesselman, J. T. and A. H. Lange. Although small trees would never be sprayed with postemergence herbicides because of the danger contact with the foliage, it is valuable to know the relative phytotoxicity of herbicides to the trunks of young trees. The objective of this experiment was to compare 3 postemergence herbicides with 2,4-D (Emulsamine) known to cause injury to the trunks of young trees.

The trees were planted late 3/20/79. They were weak, late planted, small diameter trees close to 1/4" to 3/8". The sprays were applied 5/15/79 and evaluated 6/10/79 and 9/20/79.

Glyphosate (Roundup) caused injury at rates of 4 lb ai/A and above, but the injury from MSMA (Bueno 6) was greater. Both seemed more phytotoxic through the trunk than 2,4-D. Dinoseb (Dow General) appeared less phytotoxic applied to the trunk than the other 3 herbicides in this experiment.

Table 1. The effect of late spring postemergence sprays on the trunks of newly planted Non-Pareil almond trees. (425-73-502-100-1-79).

Herbicides	lb/A	Average Phytotoxicity[1/] 6/10/79	9/20/79
Glyphosate	2	4.0	3.3
Glyphosate	4	4.1	7.3
Glyphosate	8	5.7	9.7
Glyphosate	16	6.1	8.0
Dinoseb	4	2.2	1.0
Dinoseb	8	3.3	5.0
Dinoseb	16	3.3	4.0
MSMA	4	1.1	3.7
MSMA	8	3.3	10.0
MSMA	16	7.8	9.7
2,4-D	4	1.1	3.0
Check	-	3.8	1.7

1/ Average of 3 replications where 0 = no effect and 10 = dead. Treated 5/15/79.

Control of silverleaf nightshade (white horsenettle) in almonds. Lange, A. H., J. T. Schlesselman and H. M. Kempen. An almond orchard heavily infested with silverleaf nightshade (Solanum elaegnifolium Cav.) was treated on 6/29/77 with norflurazon (Solicam) at 2 and 4 lb ai/A and oxyfluorfen (Goal) at 2 and 4 lb ai/A. The plots were 2 centers wide (48') by 73' long with 3 replications. The trees were growing in sandy loam soil the 60% sand, 23% silt, 17% clay and 1.3% organic matter. The orchard was under sprinkler irrigation. The trial has since been retreated on 2/1/78 and 2/7/79.

The evaluation taken 6/24/79 resulted in norflurazon giving excellent weed control at 4 lb/A and almost as good control at the low rate (Table 1). Oxyfluorfen was 100% effective on cheeseweed and showed excellent activity against clover. However, oxyfluorfen showed little effect on marestail, pineappleweed and especially silverleaf nightshade.

By 9/13/79, norflurazon's activity was slightly reduced, but was still very good on all 5 weed species rated (Table 2). Oxyfluorfen was most effective on puncturevine, but still showed little activity against silverleaf nightshade.

There was a slight intraveinal chlorosis displayed by some of the trees treated with the high rate of norflurazon, but in no way appeared injurious to the overall growth of the trees.

Table 1. The effect of two preemergence herbicides on the control of six weed species (425-15-502-146-1-77).

Herbicides	lb/A	Weed Control[1/] Silverleaf Nightshade	Cheeseweed	Marestail	Clover	Pineapple Weed	Nutsedge
Norflurazon	2	9.5	9.7	7.5	9.7	8.3	10.0
Norflurazon	4	9.8	10.0	9.2	10.0	9.7	10.0
Oxyfluorfen	2	0.0	10.0	1.0	7.0	3.7	0.0
Oxyfluorfen	4	1.0	10.0	4.0	9.3	1.7	0.0
Check	-	4.3	0.0	0.0	1.0	0.0	0.0

1/ Average of 3 replications where 0 = no effect and 10 = complete control. Treated 6/29/77, 2/1/78, 2/7/79. Evaluated 4/24/79.

Table 2. Activity of two preemergence herbicides on five weed species and mature almond trees (425-15-502-146-1-77).

Herbicides	lb/A	Weed Control[1/] Silverleaf Nightshade	Puncturevine	Flaxleaf Fleabane	Nutsedge	Clover	Almond Phyto[2/]
Norflurazon	2	7.3	7.0	7.3	8.7	7.0	0.0
Norflurazon	4	9.0	8.3	8.0	10.0	10.0	0.7
Oxyfluorfen	2	3.3	9.0	7.3	6.7	7.7	0.0
Oxyfluorfen	4	4.0	8.7	7.0	5.3	6.0	0.0
Check	-	3.3	3.7	6.0	2.0	4.3	0.0

1/ Average of 3 replications where 0 = no control and 10 = complete weed control.
2/ Average of 3 replications where 0 = no effect and 10 = complete kill of tree. Treated 6/29/77, 2/1/78, 2/7/79. Evaluated 9/13/79.

The effect of combining preemergence and postemergence herbicide applications for the control of bermudagrass in an almond orchard. Elmore, C. L., D. Rough, A. H. Lange, and R. G. Snyder. Postemergence herbicide treatment of bermudagrass in one or even 2 year programs has not given complete or long term control. Glyphosate (Roundup) has, when applied properly, controlled the emerged plant; yet the bermudagrass seed has been left undisturbed to germinate when conditions are favorable. The combination of a preemergence herbicide for seedling control and a postemergence herbicide for emerged plant control was proposed to provide total bermudagrass control. A mature (bearing) almond orchard planted on a sandy loam series soil with a uniform established bermudagrass sod was selected in the Escalon area of San Joaquin County. Single tree plots 10' wide and 28' long of Non-Pareil and Merced almond trees were selected for treatment. Glyphosate was applied at 1, 2 and 4 lb ai/A (salt) with water at a 50 gpa rate. The remaining plots were treated with the same rates of glyphosate in combination with oryzalin (Surflan) at 4 lb/A. Dalapon (Dowpon M) at 4 lb ai/A was applied singularly and in combination with the same rate of oryzalin as a comparison. The oryzalin was applied 1/8/79, insuring adequate incorporation by rainfall. The postemergence herbicide application was made on 5/22/79, when the bermudagrass growth was determined to be sufficient for treatment. The 1979 treatment was the 4th in this study. The effectiveness of the treatments was evaluated by rating the bermudagrass control on 2 dates in 1979. Glyphosate at 4 lb/A, glyphosate at 2 lb/A plus oryzalin at 4 lb/A and glyphosate at 4 lb/A plus oryzalin at 4 lb/A gave excellent bermudagrass control. Glyphosate at 2 lb/A and glyphosate at 1 lb/A plus oryzalin at 4 lb/A, while less effective, did provide acceptable control. A significant observation was that oryzalin at 4 lb/A plus paraquat at 1 lb has, after 4 treatments, given partial control of the perennial form of bermudagrass. In addition, oryzalin has suppressed annual weed species invading the plots eradicated of bermudagrass.

Perennial Weed Control in Almonds

Herbicides	lb/A	Weed Control[1/] Bermudagrass 5/22/79	Bermudagrass 10/11/79	Crabgrass 10/11/79
Dalapon	4	3.5	4.2	6.8
Dalapon+Oryzalin	4+4	3.2	3.5	8.0
Glyphosate	1	4.5	5.5	6.0
Glyphosate+Oryzalin	1+4	5.5	7.2	7.8
Glyphosate	2	6.2	8.2	4.2
Glyphosate+Oryzalin	2+4	7.0	9.0	8.8
Glyphosate	4	7.8	9.5	5.5
Glyphosate+Oryzalin	4+4	9.0	9.8	9.5
Oryzalin+Paraquat	4+1	4.0	6.2	10.0
Control (Paraquat)	(1)	0.5	4.2	4.0

1/ Weed control rated at 0 = no control and 10 = complete control. Treatment dates - Oryzalin applications: 10/14/79, 3/18/77, 2/21/78, 12/8/78. Dalapon, glyphosate and paraquat applications: 10/14/76, 6/2/77, 6/14/78, 5/22/79.

The effect of combining preemergence and postemergence herbicide applications for bermudagrass control in a mature almond orchard. Elmore, C. L. D. M. Holmberg, A. H. Lange and R. G. Snyder. Glyphosate (Roundup) application for bermudagrass control in 1 or even 2 year programs has not provided total bermudagrass control. While the emerged plants and their perennial structures have been destroyed, the bermudagrass seed has been left undisturbed to germinate with the benefit of little or no competition from established plants. This study combining preemergence and postemergence herbicides was proposed to develop a more effective program for bermudagrass control. A mature (bearing) Mission and Thomson almond orchard planted on a silty loam series soil was selected in the delta district of

Solano County. Single tree plots 10' wide by 22' long with uniform established bermudagrass sod were randomly selected for treatment. Glyphosate at 1, 2 and 4 lb ai/A (salt) was applied independently and jointly with oryzalin (Surflan) at 4 lb ai/A. Dalapon (Dowpon M) at 4 lb ai/A applied singularly and in combination with oryzalin at 4 lb/A was considered a standard for comparison. The 1979 applications were the 4th in this study. Glyphosate at 4 lb/A plus oryzalin at 4 lb/A provided excellent bermudagrass control. Glyphosate at 2 and 4 lb/A and glyphosate at 2 plus oryzalin at 4 lb/A gave acceptable control. But, in all treatments where glyphosate was the sole herbicide, malva became the dominate weed species and a detriment to orchard floor operations. Where oryzalin at 4 lb/A was included, the malva stand was effectively suppressed. The remaining treatments were not acceptable.

Perannial weed control in almonds

Herbicides	lb/A	Weed Control[1/] Bermudagrass 5/17/79	Bermudagrass 8/21/79	Bermudagrass 10/21/79	Malva 8/21/79	Malva 10/21/79	Dandelion 8/21/79	Crabgrass 8/21/79
Dalapon	4	4.0	1.7	3.3	5.0	5.7	5.7	10.0
Dalapon+Oryzalin	4+4	2.0	2.0	4.7	9.3	7.3	8.7	10.0
Glyphosate	1	6.0	3.3	6.7	5.0	5.3	6.7	10.0
Glyphosate+Oryzalin	1+4	3.0	3.3	6.3	9.7	7.7	9.0	10.0
Glyphosate	2	6.7	5.3	7.0	4.3	4.3	6.0	9.3
Glyphosate+Oryzalin	2+4	9.0	7.0	8.0	8.0	7.7	8.7	10.0
Glyphosate	4	10.0	7.3	8.7	4.7	4.0	7.0	8.7
Glyphosate+Oryzalin	4+4	9.7	8.7	10.0	7.7	8.0	9.0	10.0
Oryzalin+Paraquat	4+1	0.7	1.7	5.3	9.0	9.3	9.7	10.0
Check (Paraquat)	(1)	0.7	1.3	1.0	8.0	9.0	8.7	9.7

1/ Weed control rated as 0 = no control and 10 = complete control.
Treatment dates: 12/13/78: Oryzalin, Paraquat; 8/21/79: Dalapon, Glyphosate, Paraquat.

The comparison of 2 postemergence herbicides for the control bermudagrass in a mature almond orchard. Elmore, C. L., D. M. Holmberg, A. H. Lange and R. G. Snyder. A mature (bearing) orchard of Mission and Thompson almond trees planted on a silty loam series soil in the delta region of Solano County was selected for the trial. Single tree plots 10' wide and 22' long with uniform established bermudagrass sod were randomized for treatment. Glyphosate (Roundup) at 1, 2 and 4 lb ai/A (salt) and dalapon (Dowpon M) at 4 lb ai/A were applied on 8/21/79. The dalapon was considered the standard treatment for comparative evaluation. The 1979 application was the 3rd in this study. The trial was evaluated for bermudagrass and annual weed control on 3 dates in 1979. Glyphosate at 4 lb/A gave excellent bermudagrass control; while, glyphosate at 2 lb/A gave acceptable control. Both glyphosate at 1 lb/A and dalapon at 4 lb/A provided unsatisfactory control. In treatments where bermudagrass was suppressed or eradicated, malva became the dominant weed species to the extent of disrupting orchard operations.

Almond trial-Perannial weed control-postemergence treatments

Herbicides	lb/A	Weed Control[1/] Bermudagrass 5/17/79	Bermudagrass 8/21/79	Bermudagrass 10/12/79	Malva 8/21/79	Malva 10/12/79	Dandelion 8/21/79	Crabgrass 8/21/79
Glyphosate	1	5.0	1.5	5.2	6.2	5.8	7.2	9.5
Glyphosate	2	9.8	5.5	8.0	4.0	5.0	7.5	5.2
Glyphosate	4	10.0	5.2	9.8	3.2	2.5	6.5	5.5
Dalapon	4	3.8	3.2	3.2	5.2	8.0	6.2	6.2
Check (Paraquat)	(1)	0.0	0.2	1.2	7.2	8.0	7.2	9.8

1/ Weed control rated as 0 = no control and 10 = complete control.
Treated 8/21/79.

Combinations for control of perennial bindweed. Lange, A. H. and J. T. Schlesselman. Combinations of chemicals have been found to increase the control of difficult perennial weeds. The objective of this experiment was to evaluate specific combinations for the control of perennial bindweed.

A heavy stand growing on the westside in a Panoche clay loam was divided up into 15' X 15' plots and treated with foliar applications using a 3 nozzle constant pressure back pack unit. The pretreatments of etheral were applied 8/20/78 and the subsequent applications made on 8/30/78.

A second set of plots was applied in the same field 11/17/79.

A third set was applied to wet vs. dry soil. The soil in the wet area was irrigated 4 weeks before herbicide applications.

The pretreatment of perennial bindweed about a week before herbicide application with etheral or RO 1745 had no significant beneficial effect. However the combination of glyphosate plus dicamba plus amitrole gave outstanding control with only 1 lb/A of dicamba per acre. If bindweed can be controlled with this low rate of dicamba, resistant crops could follow treatment including grass family crops. We know that trees will not tolerate high rates of dicamba, however, no work has been done with rates in 1 lb/A range in the tolerance of orchard species. It is quite possible that low rates of dicamba may be tolerated. If not combinations of glyphosate and dicamba, then combinations with some herbicide that trees will tolerate.

The presence of adequate moisture appeared to result in better control than bindweed growing under water stress.

Table 1.
The effect of several chemical treatments on the control of perennial bindweed.

Herbicides[3]	Rate	Average[1] Perennial Bindweed Control 11/7	3/7	5/7
Glyphosate+Etheral[2]	2+2000 ppm	5.5	7.0	5.0
Glyphosate+Etheral[2]	2+4000 ppm	5.0	7.2	3.5
Glyphosate+RO 1745[2]	2+4000 ppm	5.5	7.5	2.0
Glyphosate[2]+Dicamba	2+2	9.3	9.8	8.8
Glyphosate[2]+Dicamba+ATA	2+1+1	9.0	10.0	7.2
Glyphosate[2]+Dicamba+ATA	2+2+2	9.3	10.0	9.2
Glyphosate	4	7.8	8.5	6.0
Dicamba	2	8.0	10.0	9.8
2,4-D	4	8.0	7.5	4.2
Check	-	1.8	1.8	1.8

1/ Average of 4 replications where 0 = no effect and 10 = compelte control.
2/ Pretreatment 8/21/78.
3/ Except where indicated.

Table 2.
The effect of moisture stress on control of perennial bindweed with glyphosate.

Herbicides	lb/A	Soil Condition Wet	Dry
11/7/78 (evaluation date)			
Glyphosate+Etheral	2+4000 ppm	7.0	4.0
Dicamba+Etheral	2+4000 ppm	9.5	8.0
Check	-	0.0	0.0
3/17/79 (evaluation date)			
Glyphosate+Etheral	2+4000 ppm	9.0	5.5
Dicamba+Etheral	2+4000 ppm	10.0	8.0
Check	-	0.0	0.0

Combinations for perennial bindweed control. Lange, A. H., D. Cudney, W. Humphrey, and R. Keim. The control of perennial bindweed is not easy. Eradication is nearly impossible. Glyphosate (Roundup) often gives satisfactory control, but sometimes gives dismal failures. The cause of this variation is not known. The physiological condition of the bindweed plant is believed to be a key factor in susceptibility or tolerance. Dicamba (Banvel) has always been the most effective material probably because it is foliar and soil absorbed making it effective at several points in the life cycle of the plant. Dicamba's decided disadvantage is its residual effect on subsequently planted crops. Certain crops such as those in the grass family are more tolerant than the broadleaf crops.

By using low rates of Banvel in various combinations with high rates of glyphosate it may be possible to increase the control of bindweed and still be able to grow a profitable crop.

In early trials on bindweed, nutsedge and Russian knapweed it has been possible to influence the effect of Roundup on plants by pretreatment with etheral and other growth regulating chemicals. The objective of the field trial was to determine the effect of pretreating perennial bindweed with etheral, amino triazole or glyphosate 11 days prior to a second treatment of glyphosate or dicamba.

The first set of chemicals was applied 4/9/79 to 15' X 15' plots. The second set of chemicals was applied 4/20/79. The pretreatments included 4000 ppm etheral, 4 lb/A amino triazole and glyphosate at 2 lb/A. The second set of overlapping treatments were glyphosate and dicamba at 3 rates each and 2,4-D at one rate.

The initial effect on the bindweed was evaluated on 4/28/79 on the basis that 0 = no effect and 10 = perfect control, i.e., no regrowth. The results showed a consistent and decided advantage to pretreatment with etheral at 4000 ppm over no pretreatment in the early regrowth. The combination of amitrole and glyphosate were not striking, but combinations of 2,4-D and glyphosate were significantly better than either alone in the early regrowth. By the middle of summer, on 7/19/79 (3 months after treatment), only those treatments with dicamba had better bindweed control. Additives to dicamba did not greatly enhance control in this later reading. The differences in the first reading seemed to be outgrown except for apparent residual effects of dicamba itself.

Table 1.
The initial effect of combinations of chemicals on the control of perennial bindweed. (425-30-502-1-79).

		Simultaneous Combinations			Pretreatment	
Herbicides	lb/A	Amitrole 4 lb/A	2,4-D 2 lb/A	2,4-D+Amitrole 2+4 lb/A	0	Etheral 4000 ppm
Glyphosate	2	2.0	7.2	-	1.8	5.0
Glyphosate	4	3.2	8.2	7.8	1.0	4.8
Glyphosate	8	3.8	-	-	-	5.8
Dicamba	1	6.0	5.8	-	4.5	7.2
Dicamba	2	4.8	6.0	5.8	4.8	6.5
Dicamba	4	-	-	-	5.0	7.5
Check	-	6.5	5.8	-	0.0	-

1/ Average of 4 replications where 0 = no effect and 10 = complete control. Evaluated 4/28/79. Treated 4/9/79 and 4/20/79.

Table 2.
The effect of combinations of chemicals on the control of perennial bindweed at 3 months (425-30-502-1-79).

		Average[1/] Simultaneous Combinations			Pretreatment	
Herbicides	lb/A	Amitrole 4 lb/A	2,4-D 2 lb/A	2,4-D+Amitrole 2+4 lb/A	0	Etheral 4000 ppm
Glyphosate	2	6.0	6.8	-	6.5	5.5
Glyphosate	4	5.8	5.2	6.2	7.2	5.8
Glyphosate	8	6.5	-	-	7.0	6.5
Dicamba	1	7.8	7.2	-	6.5	7.8
Dicamba	2	7.5	8.5	8.0	8.2	8.0
Dicamba	4	9.2	-	-	9.8	8.8
Check	-	2.0	2.8	-	0.0	-

1/ Average of 4 replications where 0 = no effect and 10 = complete control. Evaluated 7/19/79. Treated 4/9/79, 4/20/79.

Table 3. The effect of combinations of chemicals on the control of perennial bindweed at 6 months. (425-30-502-1-79).

Herbicides	lb/A	Simultaneous Combinations: Amitrole 4 lb/A	2,4-D 2 lb/A	2,4-D+Amitrole 2+4 lb/A	Pretreatment: 0	Etheral 4000 ppm
Glyphosate	2	4.3	4.5	-	4.8	3.3
Glyphosate	4	4.0	3.3	3.3	4.0	3.5
Glyphosate	8	4.3	-	-	4.0	4.5
Dicamba	1	4.0	3.8	-	4.3	5.3
Dicamba	2	4.8	4.8	3.5	6.0	3.8
Dicamba	4	5.8	-	-	7.8	6.8
Check	-	3.3	3.5	-	2.3	-

1/ Average of 4 replications where 0 = no effect and 10 = complete control. Treated 4/9/79, 4/20/79. Evaluated 10/23/79.

An evaluation made on 8/14/79 showed glyphosate to be 100% effective with all rates (see table). MSMA completely killed the dallisgrass at the high rate, but was still effective at the 5% concentration. Amitrole, although yellowing the foliage, had little effect on the dallisgrass.

More studies are to be conduted this next year on a variety of herbicides and rates to determine the lowest rate of certain herbicides, such as glyphosate, that can control problem weeds using this new approach in herbicide application.

Postemergence dallisgrass control using sponge mop applicator.

Schlesselman, J. T. and A. H. Lange.

New techniques in postemergence herbicide application are presently being investigated to determine if the margin of crop safety can be increased when using herbicides such as glyphosate (Roundup), MSMA (Bueno 6) and amitrole (Weedazol). Crop susceptibility to herbicide drift is an important consideration when using the conventional spray delivery system. Obviously the maximum amount of safety to crops can be incurred by using a direct contact, non-spray means of applying postemergence herbicides.

The perennial dallisgrass has been an increasing problem in nontillage orchard and vineyard situations where annual applications of preemergence herbicides have no effect on this growing menace. Sponge mop applications using glyphosate, MSMA and amitrole were applied on 7/27/79 to the foliage of individual bunches of dallisgrass. concentrations of 5%, 10% and 20% a.i. of each herbicide were used, replicating the treatments 3 times.

Effect of sponge mop applications of 3 herbicides on dallisgrass. (425-73-502-10-79).

Herbicides	Percent by weight	Dallisgrass 1/ Control
Glyphosate	5%	10.0
Glyphosate	10%	10.0
Glyphosate	20%	10.0
MSMA	5%	8.0
MSMA	10%	9.3
MSMA	20%	10.0
Amitrole	5%	2.7
Amitrole	10%	5.0
Amitrole	20%	4.3
Check	-	0.0

1/ Average of 3 replications where 0 = no effect and 10 = complete control. Treated 7/27/79. Evaluated 8/14/79.

Nutsedge control in almonds. Schlesselman, J. T. and A. H. Lange. Heavy infestations of nutsedge are increasing in deciduous fruit and nut orchards since many of the registered herbicides are ineffective in controlling this weed. A trial was established in a nutsedge infested almond orchard in hopes of controlling this weed as well as the annual weeds which also grew in the orchard.

On 1/21/77, simazine (Princep) at 1/4, 1 and 2 lb ai/A and norflurazon (Solicam) at 2, 4 and 6 lb ai/A were sprayed at 50 gpa onto 2-tree plots, 48' by 12', replicating them 3 times. The soil was a loamy sand with 83% sand, 14% silt, 3% clay and 0.41% organic matter under sprinkler irrigation. All plots were retreated on 1/26/78.

The evaluation taken on 1/12/79 showed both herbicides giving very good winter annual weed control, even though nearly one year had lapsed since the last retreatment (Table 1).

The latest retreatment was on 1/12/79, with the only change being increasing the high rate of norflurazon from 6 to 8 lb ai/A.

Table 2 shows the weed control evaluation taken 7/20/76. The best cupgrass and nutsedge control was obtained with norflurazon. Doubling the rate of norflurazon from 4 to 8 lb/A did not appear to increase weed control significantly. Furthermore, the 8 lb rate of norflurazon resulted in some chlorosis to the leaves of the lower branches of the almond trees, but did not appear severe enough to reduce growth or yield.

Table 1. Activity of two preemergence herbicides on winter annual weeds in almonds (425-10-502-146-6-77).

Herbicides	lb/A	Weed Control[1]	Weeds Present[2]
Simazine	1/4	8.7	R,S
Simazine	1	7.7	S,R
Simazine	2	8.7	R,S
Norflurazon	2	8.3	R,S,G
Norflurazon	4	8.7	R,S,F
Norflurazon	6	7.7	R,S,G
Check	-	3.3	R,S

1/ Average of 3 replications where 0 = no effect and 10 = complete weed control. Treated 1/21/77, 1/26/78. Evaluated 1/12/79.
2/ Weeds present: S-shepherd's purse, R-redmaids, F-redstem filaree, G-common groundsel.

Table 2. A comparison of two herbicides applied to a sandy soil under sprinkler irrigation in a mature almond orchard (425-10-502-146-6-77).

		Weed Control[1]			
Herbicides	lb/A	Cupgrass	Nutsedge	Other Weeds[2]	Phyto[3]
Simazine	1/4	6.0	4.3	10.0	0.0
Simazine	1	5.7	6.7	8.7B	0.0
Simazine	2	7.0	5.7	10.0	0.0
Norflurazon	2	7.0	7.3	10.0	0.0
Norflurazon	4	8.3	9.0	10.0	0.0
Norflurazon	8	9.0	8.7	9.3B	1.7
Check	-	3.0	1.7	4.7L	0.0

1/ Average of 3 replications where 0 = no control and 10 = complete control.
2/ Other weeds: B-bermudagrass, L-lambsquarters.
3/ Average of 3 replications where 0 = no effect and 10 = complete kill. Treated 1/21/77, 1/26/78, 1/12/79. Evaluated 7/20/79.

CHEMICAL INDEX

A PROGRESS REPORT

The conclusions drawn from this work should not be used as recommendations. General recommendations for weed control in crops must be based on a very large number of field experiments conducted in all of the soil types under all of the irrigation practices, and in all of the seasons where the crop is normally grown, and under all the planting dates when grown in California, and for all the varieties used, as well as quality of the end product of the many products produced from this crop.

By including this written report with the previous work published and the future work yet to be done, we expect eventually to develop recommendations for weed control in several crops. In the interest of having this report available for use for next year's work, this report has had limited review. Any mistakes or questions should be directed to the Senior Author.

PESTICIDE USE WARNING
READ THE LABEL

Pesticides are poisonous and must be used with caution. Read the label carefully before opening a container. Precautions and directions must be followed exactly. Special protective equipment as indicated must be used.

Storage: Keep all pesticides in original containers only. Store separately in a locked shed or area. Keep all pesticides out of the reach of children, unauthorized personnel, pets and livestock. Do not store with foods, feeds or fertilizers. Post warning signs on pesticide storage areas.

Use: The suggestions given in this publication are based upon best current information. Follow directions: measure accurately to avoid residues exceeding tolerances, use exact amounts as indicated on the label or lesser amounts given in this publication. Use a pesticide only on crops, plants or animals shown on the label.

Container Disposal: Consult your County Agricultural Commissioner for correct procedures for rinsing and disposing of empty containers. Do not transport pesticides in vehicles with foods, feeds, clothing, or other materials, and never in a closed cab with the vehicle driver.

Responsibility: The Grower is legally responsible for proper use of pesticides including drift to other crops or properties, and for excessive residues. Pesticides should not be applied over streams, rivers, ponds, lakes, runoff irrigation or other aquatic areas except where specific use for that purpose is intended.

Beneficial Insects: Many pesticides are highly toxic to honey bees and other beneficial insects. The farmer, the beekeeper and the pest control industry should cooperate closely to keep losses of beneficial species to a minimum.

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 making a pesticide application.

Posting Treated Fields: When worker safety reentry intervals are established by sure to keep workers out and post the treated areas with signs when required indicated the safe reentry date.

Permit Requirements: Many pesticides require a permit from the County Agricultural Commissioner before possession or use. Such compounds mentioned in this publication are marked with an asterisk (*).

Plant Injury: Certain chemicals may cause injury or give less than optimum pest control if used:

- at the wrong stage of plant development
- in certain soil types
- when temperatures are too high or too low
- at the wrong formulation
- at excessive rates
- with incompatible materials.

Personal Safety: Follow label directions exactly. Avoid splashing, spilling, leaks, spray drift or clothing contamination. Do NOT eat, smoke, drink, or chew while using pesticides. Provide for emergency medical care in advance.

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