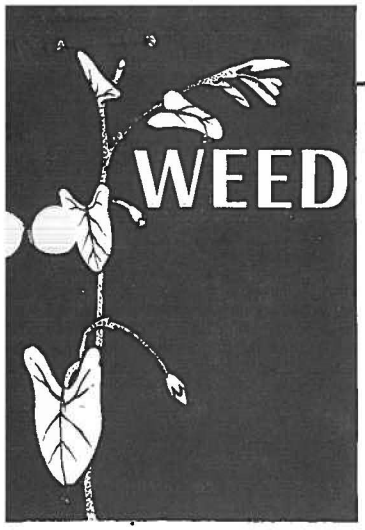
Project Number 78-U3

COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA



WEED CONTROL NOTES PROGRESS REPORT

The authors are:

Arthur H. Lange, Weed Scientist, Parlier; J. T. Schlesselman, Staff Research Associate, Parlier; Harold Kempen, Kern County Farm Advisor; Ron Vargas, Madera County Farm Advisor; Lonnie Hendricks, Merced County Farm Advisor.

WEED CONTROL IN ALMONDS 1978

Series 78:5

This continuing project has been aimed at developing information to help in the registration of new herbicides for use on major weed problems in almond orchards. These problems are basically: (1) to find safe economic preemergence herbicide programs for annual weed control, and (2) an effective program of cultural practices and herbicides for perennial weed control in almonds.

Low rates of Princep combined with Devrinol or Surflan have done a good job, except where a few tolerant weed species prevail or where the period between application and rainfall (or sprinkler irrigation) has been too long for the herbicide, or where too little or too much water has followed application. In a Hanford sandy loam, an initial irrigation of 1/4 inch of water was adequate and a 2 inch initial irrigation was excessive for some herbicides. A season of insufficient rainfall can be supplemented by bringing in sprinklers to incorporate the herbicide or by throwing a thin layer of treated soil over the treated layer. This helped to preserve the surface applied herbicides until incorporated by rainfall or tillage. Trash, i.e., leaves, etc. on the soil surface reduced activity with some herbicides.

Perennial weeds such as bermudagrass, johnsongrass, bindweed, silver leaved nightshade, and nutsedge compete for water and nutrients. Some observations suggest that there is more to the depressed growth from perennials than competition for water and nutrients. The heavy infestation must be eliminated from good almond orchards or the trees will continue to decline until it becomes unprofitable. The most effective method of controlling these perennials includes incorporating a soil active preemergence herbicide such as Treflan against bermuda, johnsongrass, and bindweed followed by Roundup or preceeded by Roundup 2 to 7 days prior to incorporation of Treflan. This approach has been effective when

The University of California Cooperative Extension in compliance with the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and the Rehabilitation Act of 1973 does not discriminate on the basis of race, creed, religion, color, national origin, sex, or mental or physical handicap in any of its programs or activities. Inquiries regarding this policy may be directed to: Warren E. Schoonover, 317 University Hall, University of California, Berkeley, California 94720, (415) 642-0903.

University of California and the United States Department of Agriculture cooperating.

Roundup has been applied in the summer and fall followed by Treflan incorporation. As of December 8, 1978 Roundup is registered for bearing almonds. The new labels for its use will be forthcoming.

This years reports are discussed under each separate report of the experiment. The summarized data can be studied and the individual report authors or the overall principle authors can be consulted for further details.

The long term effect of herbicides alone and in combination on almonds.
Fishcher, B. B. and A. Lange.
On January 26, 1976, seven herbicides alone and incombination were applied in 1520 cc of water per plot with a CO_2 sprayer to almonds in a Hanford sandy loam soil. The method of irrigation was sprinkler. The trial was retreated on 1/6/77 and 1/17/78. The 1978 evaluation for weed control and phytotoxicity was taken on 8/31/78.

The effect of 7 herbicides alone and in combination on weed control and phytotoxicity in almonds. (425-10-146-C61-5-76)

Herbicide	lb/A	Average[1] Phyto.	W/C
Simazine+Oryzalin	1/2+4	0.0	9.8
Simazine+Napropamide	1/2+4	0.0	9.2
Simazine+Prodiamine	1/2+2	0.0	9.8
Prodiamine	4	0.0	9.8
Prodiamine	8	0.0	9.2
Oxyfluorfen	2	0.0	8.5
Oxyfluorfen	4	0.0	10.0
Oxyfluorfen	8	0.0	9.8
Oxyfluorfen+Napropamide	2+4	0.0	10.0
Oxyfluorfen+Oryzalin	2+4	0.0	10.0
Simazine+Penoxalin	1/2+4	0.0	10.0
Simazine+Napropamide	1+4	0.0	9.0
Simazine+Oryzalin	1+4	0.0	9.8
Simazine+Oxadiazon	1/2+4	0.0	9.5
Check	-	0.0	7.8

[1] Average of 4 replications. Based on 0 to 10 scale where 0 = no effect, 10 = complete weed control or complete kill of plant.
Treated 1/26/76, 1/6/77 and 1/17/78. Evaluated 8/31/78.

The herbicide combinations showed excellent weed control and no sign of phytotoxicity. The high rating in the check was the result of the grower spraying out the plots.

Effect of 2 preemergence herbicides in a young almond orchard.
A trial was established in a 4 year old almond orchard in a loamy sand soil (83% sand, 14% silt, 3% clay and 0.41% organic matter). On 1/21/77 oxyfluorfen (Goal) at 1, 2 and 4 lb/acre and oxadiazon (Ronstar) at 2 and 4 lb/acre were applied to 2 tree plots (48' x 12') replicated 3 times. The plots were then sprinkler irrigated.

The whole orchard was disked several times making it impossible to take any kind of a weed control rating. On 10/28/77 soil was removed from each plot and stored in sealed plastic bags. The soil was taken to the greenhouse at the Kearney Horticultural Field Station, Parlier and seeded with broccoli and ryegrass on 12/29/77 to determine the residual activity of the herbicides.

An evaluation made 1/19/78 shows oxyfluorfen to be somewhat active on broccoli at 2 and 4 lb/acre and considerably more active on ryegrass at those rates. Oxadiazon is also showing quite a bit of residual activity at 1 year after treatment. No phytotoxicity was observed to the almond trees.

Effect of 2 preemergence herbicides applied to an almond orchard as shown by phytotoxicity to seeded broccoli and ryegrass. (425-10-501-146-4-77)

Herbicide	lb/A	Ave. Phytotoxicity 1/ Broccoli	Ryegrass
Oxyfluorfen	1	0.0	1.0
Oxyfluorfen	2	3.0	5.0
Oxyfluorfen	4	1.5	7.2
Oxadiazon	2	2.5	3.2
Oxadiazon	4	6.2	8.2
Check	-	0.0	0.5

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant. Treated 1/21/77. Soil removed 10/28/77. Seeded 12/29/77. Evaluated 1/19/78.

Comparison of 5 preemergence herbicides on puncturevine control in almonds.
A 5 year old almond orchard infested with puncturevine was treated with 5 preemergence herbicides on 2/14/78. Plot size was 66' (3 trees) x 10' with 2 replications.

An evaluation made 7 months after treatment shows oryzalin (Surflan) to be 100% effective on puncturevine, even at 2 lb/acre.

Oxyfluorfen (Goal) and prodiamine (Rydex) gave excellent control except the low rate of prodiamine which was slightly below being commercially acceptable (<7.0). Napropamide (Devrinol) was rather weak in controlling puncturevine as was norflurazon (Solicam). In previous trials, norflurazon has shown greater activity against puncturevine. No phytotoxicity was observed on the young trees.

Comparison of 5 preemergence herbicides in controlling puncturevine in 5 year old almond orchard. (425-10-501-146-7-77)

Herbicide	lb/A	Puncturevine Control 1/
Oxyfluorfen	2	7.5
Oxyfluorfen	4	8.0
Oxyfluorfen	8	9.0
Prodiamine	2	6.0
Prodiamine	4	9.0
Prodiamine	8	8.5
Oryzalin	2	10.0
Oryzalin	4	10.0
Oryzalin	8	10.0
Norflurazon	1	3.0
Norflurazon	2	3.0
Norflurazon	4	2.5
Napropamide	4	5.0
Check	-	0.0

1/ Average of 2 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 2/14/78. Evaluated 9/20/78.

The use of preemergence herbicides in a nonpariel almond orchard.
Vargas, R., A. H. Lange and J. T. Schlesselman
A trial was established in a 2 year old nonpariel almond orchard on 11/15/76 in a sandy loam soil with 72% sand, 17% silt, 11% clay and 0.78% organic matter. The plots were 48' x 6-1/2' replicated 4 times. All plots were retreated on 1/4/78.

The evaluations made 5 and 14 months after initial treatment resulted in norflurazon (Solicam), giving the best weed control, even at 2 lb/acre which is the recommended rate for use in other tree species. One reason for the reduced effectiveness with the other treatments may have been the prolonged 1977 drought which possibly prevented the necessary "rainfall incorporation" for adequate long term activity with some of the less surface stable herbicides such as napropamide (Devrinol).

On 3/21/78 the weed control was strikingly different from that of earlier ratings. The outstanding weed control with all treatments, including the 8.3 rating for the check plots, was aided in part by the grower treating the orchard with simazine (Princep) at 1.5 lb/acre in mid-December 1977. No further weed control ratings were feasible in 1978. At no time during this trial has any phototoxicity been observed on the almond foliage.

Effect of 5 preemergence herbicides on weed control in a young almond orchard. (425-20-501-146-1-77)

Herbicides	lb/A	Average Weed Control Ratings[1] 4/28/77	1/4/78	3/21/78
Napropamide	4	6.0	5.2	8.8
Oryzalin	4	7.4	8.0	9.0
Oxyfluorfen	4	5.0	5.5	9.8
Prodiamine	4	4.9	7.0	10.0
Norflurazon	2	9.3	9.0	10.0
Norflurazon	4	9.6	9.2	10.0
Check	-	0.0	0.5	8.3

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control. Weeds present: groundsel, shepherd's purse, sowthistle, prickly lettuce, pineappleweed and nutsedge. Treated 11/15/76 and 1/4/78.

The effect of six preemergence herbicides on weed control in almonds under sprinkler irrigation.

Lange, A. H., L. Hendricks, J. Schlesselman and L. Nygren.

On December 15, 1976 six preemergence herbicides were applied to two varieties of almonds (Nonpariel and Price) while trees were in the 1st leaf stage. The method of irrigation was sprinkler. Soil was a sandy loam with 73.6% sand, 22.7% silt, 3.7% clay and 0.63% organic matter. Evaluations for weed control were taken on 3/24/77, 4/28/77 and 6/22/78.

The overall performance was best with oryzalin (Surflan) and prodiamine (Rydex). The poor showing of oxyfluorfen (Goal) with the 6/22/78 evaluation was due primarily to its weakness on grasses, of which barnyardgrass made up a considerable portion of the weed population at that time. No phytotoxicity was observed in these young almond trees.

A comparison of 6 preemergence herbicides as measured by the control of weeds in a young almond orchard. (425-24-501-146-3-77)

Herbicides	lb/A	Average Weed Control Ratings[1] 3/24/77	4/28/77	6/22/78
Oryzalin	4	6.3	9.8	9.5
Napropamide	4	8.3	8.5	6.5
Oxyfluorfen	2	9.0	6.5	3.5
Oxadiazon	4	9.0	7.8	7.5[2]
Prodiamine	4	6.3	9.5	9.5
Norflurazon	2	8.7	6.5	7.0
Check	-	4.3	0.9	1.0

1/ Average of 8 replications. Based on 0 to 10 scale where 0 = no control and 10 = complete control. Treated 12/14/76 and 1/18/78.

2/ Oxadiazon replaced by Oxyfluorfen + Napropamide 2+2 lb/A on 1/18/78.

The effect of preemergence herbicides on Marianna 2624 plum rootstock cuttings.

The understanding of the activity of preemergence herbicides is important with all growth stages of perennial crops from the rootstock seedling through the mature, fruitbearing years of established trees. Generally speaking, the younger the plant, the more susceptible it will be to injury from certain herbicides. A trial was established on 1/27/78 in a sandy loam soil (68% sand, 24% silt, 8% clay and 1.0% organic matter) at the Reedley Nursery growing grounds, Tulare County to determine the extent of injury which might be incurred by applying several preemergence herbicides to newly planted Marianna 2624 plum cuttings. Marianna 2624 is used as a rootstock for several almond varieties due to its resistance to oak root fungus.

The treatments were in a randomized block design with 5' x 3-1/3' plots having 3 replications. Within 3 months after applying the herbicides, the plots received nearly 12" of rain; over 2-1/2 times the normal amount. With this amount of rainfall, it might be expected that the herbicides could have leached further down into the soil, increasing the possibility of crop injury. However, the evaluation taken 5 months after treatment showed the vigor of the cuttings was not reduced by any of the herbicides. The reduced vigor within the plots treated with oxyfluorfen (Goal) and oryzalin (Surflan) is a result of only 1 replication being considerably less than the check, which could indicate some other factor affecting that plot. Even though vigor was not reduced in the plots with simazine (Princep) at 1/2 lb/acre and norflurazon (Solicam) alone at 4 lb/acre, there was some slight leaf symptoms displayed by plants in one of the replications. There were no weeds presentsince the area had been previously fumigated.

The effect of preemergence herbicides on the vigor of Marianna 2624 plum rootstock cuttings. (425-54-501-100-2-78)

Treatment	Lb/A	Ave. vigor[1/]
Simazine	1/2	9.6
Napropamide	4	8.6
Oryzalin	4	9.6
Norflurazon	2	10.0
Oxyflurorfen	2	8.3
Prodiamine	4	10.0
Oxyfluorfen + Napropamide	1+4	9.6
Oxyfluorfen + Oryzalin	1+4	7.6
Oxyfluorfen + Norflurazon	1+2	10.0
Oxyfluorfen + Prodiamine	1+4	9.3
Check	-	9.6

1/ Ave. of 3 reps., where 0 = no vigor; 10 = most vigorous
Treated: 1/27/78. Evaluated: 6/30/78

Effect of preemergence herbicides on Nemaguard rootstock seedlings.

On 1/27/78 a trial was established at the Reedley Nursery growing grounds in Visalia on Nemaguard seeds (often used as almond rootstock) which had been planted in a sandy loam soil with 61% sand, 29% silt, 10% clay and 1.1% organic matter. The plots were 10' x 3-1/2' with 3 replications. During the next 3 months the plots received nearly 12" of percipitation; over 2-1/2 times the normal amount for that time.

An evaluation made 5 months after the trial was established showed the Nemaguard seedlings to be unaffected by most of the herbicides. However, oxadiazon (Ronstar) severely injured the young seedlings. Also, injury occurred with the high rates of fluridone (EL-171) and oxyfluorfen (Goal), i.e., reducing vigor. When oxyfluorfen at 1 lb/acre was combined with other herbicides, a reduction of vigor also resulted.

The effect of preemergence herbicides on the vigor of Nemaguard rootstock seedlings. (425-54-501-100-1-78)

Herbicide	lb/A	Average Vigor[1/]
Simazine	½	9.0
Napropamide	2	9.7
Napropamide	4	10.0
Oryzalin	2	10.0
Oryzalin	4	9.3
Norflurazon	1	9.3
Norflurazon	2	9.3
Oxyfluorfen	1	9.0
Oxyfluorfen	2	6.0
Chloroxuron	1	10.0
Chloroxuron	2	9.3
Terbutryn	1	10.0
Terbutryn	2	9.7
Prodiamine	2	10.0
Prodiamine	4	9.7
Fluridone	½	9.3
Fluridone	1	5.3
Oxyfluorfen + Napropamide	1+4	6.7
Oxyfluorfen + Oryzalin	1+4	6.0
Oxadiazon	2	3.7
Oxadiazon	4	0.3
Oxyfluorfen + Norflurazon	1+2	8.3
Oxyfluorfen + Prodiamine	1+4	6.3
Check	-	9.7

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no vigor and 10 = most vigorous. Treated 1/27/78. Evaluated 6/30/78.

matter. Plot size was 24' (1 tree) x 10' replicated 10 times. The orchard has been under complete nontillage since the trial's inception.

The weed population has been relatively low and good comparisons with a "weedy" check has not always been possible. However, there has been a sufficient amount of watergrass (barnyard grass) in the checks this past season to warrant an evaluation. The rating made on 9/13/78 (see table) showed all treatments gave excellent watergrass control.

No phytotoxicity has been observed on any of the almond trees, i.e., growth has not been adversely affected by the annual applications of herbicides for 4 years. Trunk diameters were taken on 12/20/78 and again on 8/8/78 to determine the increase in growth over this 20 month period. All treatments showed a slight increase in growth over the untreated check. This may be due to the increased weed competition within the checks even though the weed population has been slight.

Comparison of several preemergence herbicide combinations and their long term use in a Nonpariel and Mission almond orchard.

Five herbicide combinations were applied annually together, usually during the winter, or separately, one herbicide in the winter and the other in the spring, beginning 4/18/78. The purpose of this experiment was to determine if any detrimental effects would result from the long term use of preemergence herbicides in a young Nonpariel and Mission almond orchard. These trees were planted during the spring 1973 at the West Side Field Station, Fresno County. The soil is panoche clay loam with 24% sand, 36% silt, 40% clay and 1.09% organic

Effect of preemergence herbicides on the control of watergrass and growth of almond trees. (425-78-501-H14-1-74)

Herbicides	lb/A	Watergrass Control[1/]	Trunk Diameter Increase (mm) [2/]
Simazine + Prodiamine	1+4	10.0	14.0
Simazine + Oryzalin	1+4	9.7	14.5
Simazine + Napropamide	1+4	9.8	13.6
Oxyfluorfen + Norflurazon	2+2	9.8	17.9
Oxyfluorfen + Napropamide	2+4	10.0	19.0
Simazine (+ Prodiamine)	1(+4)	10.0	17.3
Simazine (+ Oryzalin)	1(+4)	10.0	13.2
Simazine (+ Napropamide)	1(+4)	9.9	19.2
Oxyfluorfen (+ Norflurazon)	2(+2)	10.0	15.5
Oxyfluorfen (+ Napropamide)	2(+4)	10.0	17.1
Check	-	5.7	12.9

1/ Average of 10 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Evaluated 9/13/78.

2/ Average of 10 replications. Diameter taken 12/20/76 and 8/8/78. Treated: 4/18/74, 11/21/74, 12/24/75, 1/26/77, 1/26/78. Treated (within): 4/18/74, 4/20/77, 3/30/78.

The effect of long term use of simazine on non tilled orchard soils. Simazine was applied annually for 12, 9 and 3 years in strip treatments down the tree row. In the fall of 1978 samples were taken from the undisturbed treated berms and potted by diluting with soil from untreated plots which had been allowed to build-up weed populations over the years.

Instead of simazine building up from continuous applications there was no indication of build-up at 10 months after the last application. Snap beans grew normally. When the soil was diluted with various concentrations of soil from the untreated (weedy) check, the beans were damaged suggesting an accumulation of a factor detrimental to snap bean growth. This phenomenon is being investigated further.

Table 1.
The effect of repeat treating a Hanford sandy loam with simazine for 3-12 years on subsequently planted beans. (425-73-501-3-78)

Years of Continuous Annual Applications of Simazine	lb/A	Comparative Phytotoxicity Percent of Simazine treated soil 100%	75%	50%	25%	0%
12 years	2	1.2	3.2	10.0	10.0	(0.2)
No Simazine[1/]	0	9.8	8.0	6.2	0.5	0.2
9 years	2	1.5	10.0	10.0	10.0	(10.0)
9 years	4	0.8	10.0	10.0	10.0	(10.0)
No Simazine[2/]	0	9.5	9.2	9.2	9.0	10.0
3 years	2	0.0	0.0	7.2	3.8	—
No Simazine[3/]	0	8.5	9.0	3.8	9.0	3.2

Evaluated 9/28/78. Treated, potted and planted 8/31/78. Reseeded 9/14/78/
1/ Berm disturbed by tillage.
2/ Undisturbed berm, i.e., no herbicide except contact (paraquat) applied.
3/ Berm disturbed, i.e., disked for weed control.

Table 2.
The effect of diluting simazine treated soil with soil from untreated check. (425-73-501-3-78)

Herbicides	% Untreated Soil	Average[1/] Phytotoxicity
Simazine - 2 (9 years)	0	0.2
Simazine - 2	25	10.0
Simazine - 2	50	10.0
Simazine - 2	75	10.0
Simazine - 4 (9 years)	0	0.5
Simazine - 4	25	10.0
Simazine - 4	50	10.0
Simazine - 4	75	10.0
Untreated + Simazine - 2	0	9.8
Untreated + Simazine - 2	25	10.0
Untreated + Simazine - 2	50	10.0
Untreated + Simazine - 2	75	7.5
Untreated Soil (untilled)	100	10.0
Simazine - 2 (12 years)	0	0.0
Simazine - 2	25	1.0
Simazine - 2	50	9.8
Simazine - 2	75	10.0
Untreated + Simazine - 2	0	10.0
Untreated + Simazine - 2	25	10.0
Untreated + Simazine - 2	50	8.8
Untreated + Simazine - 2	75	0.2
Untreated Soil (tilled)	100	0.2
Simazine - 2 (3 years)	0	0.2
Simazine - 2	25	0.5
Simazine - 2	50	5.5
Simazine - 2	75	2.2
Untreated + Simazine - 2	0	9.8
Untreated + Simazine - 2	25	9.8
Untreated + Simazine - 2	50	2.5
Untreated + Simazine - 2	75	10.0
Untreated Soil (tilled)	100	3.8

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of snap bean plants. Evaluated 10/18/78. Sampled 9/1/78.

The effect of herbicide combinations in 6 almond varieties under drip vs. furrow irrigation.
On 2/8/77, 6 almond varieties (Neplus, Peerless, Texas, Thompson, Merced and NonPariel) were planted at the Kearney Horticultural Field Station in a Hanford sandy loam (59% sand, 33% silt, 8% clay, 0.75% organic matter). Two tree plots 30' x 5', replicated 8 times, were treated with herbicides on 3/29/77 and retreated on 8/3/78. All plots were furrow irrigated until 6/15/78 when drip irrigation was installed under 4 of the replications.

Table 1 shows the most recent weed control rating taken 10/17/78. None of the herbicide combinations were very effective on flaxleaf fleabane or mare's tail in either drip or furrow irrigation. Oxyfluorfen (Goal) + oryzalin (Surflan) and oxyfluorfen + norflurazon (Solicam) were slightly more effective when the trees were furrow irrigated than under drip. The biggest difference between drip vs. furrow was observed in the wet zones of the drip emitters, where a proliferation of weed seedlings, primarily cudweed, were flourishing irregardless of the herbicide used. Flax leaf fleabane and mare's tail were evenly distributed throughout the furrow and drip plots. Under normal conditions, the majority of the weeds in an orchard under drip irrigation would be around the emitters, but during this season, the heavy winter and spring rains resulted in an even stand of these composites over most of the entire plots.

Between 11/5/77 and 4/25/78, the Kearney Field Station received 21.65 inches of rainfall, i.e. about twice the normal amount. It would be expected than even fairly insoluble herbicides would be leached down into the root zone of young trees and could cause severe injury if the rates were high enough. After the trees had leafed out in spring there was very little phytotoxicity observed to the almond trees; primarily restricted to the herbicide combination containing norflurazon. Under normal rainfall conditions with a 4 lb/acre rate of norflurazon in this light soil, more symptoms might be expected to occur on 2-year-old almonds. This past spring was cool with temperatures averaging 11° F cooler than the 6 year previous average, and therefore, the foliar response was held to a minimum. However, during May, daily temperatures had increased an average of 23° F with several days exceeding 100° F, resulting in a rapid transpiration by the trees, which brought on a brilliant display of almost pure white intraveinal chlorosis (typical of norflurazon). The 6/2/78 rating reflected the injury symptoms by norflurazon at 4 lb/acre (Table 2). Of the 6 almond varieties, Texas appeared to be the most sensitive. None of the trees died by the end of the season but it seemed possible that several could die judging from the phytotoxicity symptoms.

The evaluation taken 10/17/78 was the first one since the drip lines had been installed under 4 of the 8 replications on 6/15/78. Table 3 shows that all varieties had begun to outgrow the norflurazon injury as shown by the reduced phytotoxicity ratings. There appeared to be no real difference in almond phytotoxicity between drip vs. furrow irrigation suggesting that most of the downwind movement of the norflurazon occurred during the rainy season.

To determine how growth may have been affected by these herbicide combinations, trunk diameters were taken on 7/20/78 and again on 12/12/78. Table 4 shows this 5 month growth increase by the 6 almond varieties. Even though the overall growth was less with the trees treated with oxyfluorfen and norflurazon, it was by no way in proportion to the severe symptoms displayed by the trees. Peerless and Merced, which appeared less injured by norflurazon than Texas, actually grew less than Texas when compared to the other treatments. The Neplus almonds treated with oxyfluorfen + norflurazon, which showed moderate symptoms, outgrew the "less affected" Neplus almonds by from 15-64%.

Table 1. The effect of 4 herbicide combinations in controlling weeds in a young almond orchard under drip vs. furrow irrigation. (425-73-501-1 5-1-77)

Herbicides	lb/A	Drip Weed Control[1]	Drip Weeds Remaining[2]	Furrow Weed Control[1]	Furrow Weeds Remaining[2]
Oxyfluorfen + Napropamide	2 4	4.2	F,C,G	4.2	F,G
Oxyfluorfen + Oryzalin	2 4	5.3	F,C,G,N	6.1	F,N
Oxyfluorfen + Prodiamine	2 4	4.5	F,C	4.5	F,N
Oxyfluorfen + Norflurazon	2 4	5.2	F,C,G	6.2	F

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control. Treated 3/29/77, 1/3/78. Evaluated 10/17/78.

2/ Weeds remaining: F = flaxleaf fleabane and marestail, C = cudweed, G = cupgrass, and N = nutsedge. Treated 3/29/77 1/3/78. Evaluated 10/17/78.

Table 2. A comparison of 4 herbicide combinations as shown by their effect on 6 almond varieties. (425-73-501-146-1-77)

Herbicides	lb/A	Phytotoxicity[1] Neplus	Peerless	Texas	Thompson	Marced	NonPariel	Average
Oxyfluorfen + Napropamide	2 4	0.0	0.3	0.0	0.0	0.0	0.0	0.1
Oxyfluorfen + Oryzalin	2 4	0.3	0.0	0.0	0.0	0.0	0.0	0.1
Oxyfluorfen + Prodiamine	2 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxyfluorfen + Norflurazon	2 4	3.0	3.5	5.5	4.4	4.3	3.6	4.1

1/ Average of 8 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of tree. Treated 3/29/77, 1/3/78. Evaluated 6/2/78.

Table 3. The effect of 4 herbicide co binations on the phytotoxicity of 6 almond varieties under drip vs. furrow irrigation. (425-73-501-146-1-77)

Herbicides	lb/A	Average Phytotoxicity Ratings[1] Drip Neplus	Peerless	Texas	Thompson	Marced	NonPariel	Average	Furrow Neplus	Peerless	Texas	Thompson	Marced	NonPariel	Average	Total Average
Oxyfluorfen + Napropamide	2 4	0.5	0.3	0.0	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.3	0.0	0.0	0.1	0.1
Oxyfluorfen + Oryzalin	2 4	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.3	0.2	0.1
Oxyfluorfen + Prodiamine	2 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.1
Oxyfluorfen + Norflurazon	2 4	2.3	1.5	4.5	3.3	2.0	2.0	2.6	2.8	3.3	3.8	2.3	3.3	2.8	3.1	2.8

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of tree. Treated 3/29/77, 1/3/78. Evaluated 10/17/78.

Table 4. Five months growth of 6 almond varieties as a result of 4 herbicide combinations under drip vs. furrow irrigation. (425-73-501-146-1-77)

Herbicides	lb/A	Trunk Diameter Increase (mm)[1] Drip Neplus	Peerless	Texas	Thompson	Marced	NonPariel	Average	Furrow Neplus	Peerless	Texas	Thompson	Marced	NonPariel	Average	Total Average
Oxyfluorfen + Napropamide	2 4	5.3	5.3	9.8	7.3	7.5	10.0	7.7	5.3	9.0	13.0	10.0	9.3	11.3	9.7	8.7
Oxyfluorfen + Oryzalin	2 4	6.3	9.3	13.8	9.5	8.3	12.3	9.9	8.8	8.0	14.8	9.0	8.5	12.5	10.3	10.1
Oxyfluorfen + Prodiamine	2 4	7.3	8.0	9.5	9.5	8.3	7.3	8.3	7.5	6.3	12.0	9.0	4.3	8.8	8.0	8.2
Oxyfluorfen +Norflurazon	2 4	8.0	6.0	9.5	7.3	5.0	8.0	7.3	9.3	3.5	12.8	8.5	5.0	8.5	7.9	7.6

1/ Average of 4 replications. Treated 3/29/77, 1/3/78. Measurements taken 7/20/78 and 12/12/78.

Long term use of preemergence herbicide combinations in a Mission almond orchard.

Mission almond trees were planted in a Hanford sandy loam (59% sand, 33% silt, 8% clay and 0.75% organic matter) on 2/5/75 at the Kearney Field Station, Parlier. The 12 planted rows were devided into complete nontillage (herbicide 10' each side tree row), strip/tillage (herbicide 5' each side tree row) and tillage (no herbicide, but periodic disking to remove weeds); 4 rows for each cultural method. The object of this experiment was to determine the long term effect of differing cultural weed control practices in terms of growth and yield of the trees as well as effect on weed control.

Preemergence herbicide combinations were applied 2/10/75, 1/9/76, 12/17/76 and 12/15/77.

This past season resulted in a very light almond harvest but was sufficient for weight comparisons. The yield data shown in Table 1 resulted in some striking differences. One of the most obvious differences was the significantly reduced yield with trees treated with oxyfluorfen (Goal) plus napropamide (Devrinol). These plots were the untreated checks until 12/17/76, which meant heavy weed competition for the

first 2 years of this trial. The result was reduced tree growth and therefore a greatly reduced almond yield in 1978.

Another difference in the yield data is the consistently larger yield in the nontillage plots as opposed to the strip/tillage plots. The disking to within 5' of the trees used to maintain a relatively weed-free zone in the strip/tillage plots, probably resulted in some root pruning, especially as these trees grew larger during the last 2 years. Root pruning or some other factor did reduce the almond yield.

Table 1. The effect of long term use of herbicide combinations for preemergence annual weed control on almond yield and weed control. (A36-73-501-H14-2-75)

Herbicides	lb/A	Average Ratings[1/] Strip kg/Tree	Strip W/C	Nontillage kg/Tree	Nontillage W/C
Simazine + Oryzalin	1 + 4	1.18	7.5	1.76	6.8
Simazine + Napropamide	1 + 4	0.61	4.0	1.23	2.5
Oxyfluorfen + Norflurazon	2 + 2	0.38	6.8	2.03	5.8
Oxyfluorfen + Prodiamine	2 + 4	1.45	7.8	3.26	5.0
Oxyfluorfen + Napropamide[2/]	2 + 4	0.05	6.3	0.03	4.3
Check (Tillage Only)[3/]		0.04	1.0		

1/ Average of 4 replications. Weed control based on 0 to 10 scale where 0 = no control and 10 = complete weed control. Treated 2/10/75, 1/9/76, 12/17/76 and 12/15/77. Yields taken 9/13/78. Weed control evaluated 5/24/78.
2/ Untreated until 12/17/76.
3/ Replicated 20 times

Table 2. Effect of long term use of preemergence herbicide combinations as shown by winter annual weed control. (A36-73-501-H14-2-75)

Herbicides	lb/A	Average Weed Control[1/] Strip Fiddleneck	Strip Shepherds Purse	Strip Redmaids	Nontillage Fiddleneck	Nontillage Shepherds Purse	Nontillage Redmaids
Simazine + Oryzalin	1 + 4	9.0	9.0	10.0	9.8	7.0	10.0
Simazine + Napropamide	1 + 4	8.8	7.8	9.8	10.0	7.3	10.0
Oxyfluorfen + Norflurazon	2 + 2	9.5	9.3	9.8	10.0	7.3	10.0
Oxyfluorfen + Prodiamine	2 + 4	10.0	9.8	10.0	10.0	7.8	10.0
Oxyfluorfen + Napropamide[2/]	2 + 4	9.5	8.5	10.0	10.0	7.5	10.0
Check (tillage)		0.3	3.8	1.8			

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 2/10/75, 1/9/76, 12/17/76, 12/15/77. Evaluated 12/19/78.
2/ Untreated until the 12/17/76 application.

Preemergence herbicides in a newly transplanted almond orchard.

A young Mission almond orchard, planted February 1978, was treated with 6 preemergence herbicides on 4/6/78 at the Kearney Horticultural Field Station, Parlier, in a Hanford sandy loam soil with 59% sand, 33% silt, 8% clay and 0.75% organic matter. Plot size was 20' (single tree) x 5' with 3 replications. The plots received 1" of rain within 12 hours after treatment and another 2" of rain during the following 3 weeks.

An initial evaluation was made on 5/24/78 and showed almost all treatments giving very good weed control; only napropamide (Devrinol) gave marginally acceptable control (Table 1). Some slight symptoms were observed with fluridone (EL-171) and the high rate of norflurazon (Solicam).

The latest evaluation taken 8 months after application showed all treatments giving excellent control of winter annual weeds (Table 2). The plots treated with napropamide were the only ones with overall weed control rating less than 9.0, but the 8.5 rating for napropamide is still quite respectable.

Table 1. Effect of treating a young almond orchard with 6 preemergence herbicides. (425-73-501-100-1-77)

Herbicides	lb/A	Average Ratings[1/] Weed Control	Phytotoxicity
Napropamide	4	6.9	0.0
Oryzalin	4	7.7	0.0
Prodiamine	4	9.0	0.0
Oxyfluorfen	4	8.3	0.0
Norflurazon	2	8.3	0.0
Norflurazon	4	9.0	0.0
Norflurazon	8	9.3	0.3
Fluridone	1	9.0	0.3
Fluridone	2	8.7	0.3
Check	-	0.3	0.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control or kill of tree. Weeds present: Marestail, nutsedge, pigweed, summer annual grasses. Treated 4/6/78. Evaluated 5/24/78.

Table 2. Activity of 6 preemergence herbicides 8 months after application as shown by 3 weed species. (425-73-501-100-1-77)

Herbicide	lb/A	Average Weed Control[1/] Fiddleneck	Shepherds Purse	Redmaids
Napropamide	4	8.4	8.1	8.9
Oryzalin	4	10.0	8.3	9.3
Prodiamine	4	10.0	8.3	10.0
Oxyfluorfen	4	10.0	9.3	10.0
Norflurazon	2	9.3	9.3	10.0
Norflurazon	4	10.0	9.3	10.0
Norflurazon	8	10.0	9.0	10.0
Fluridone	1	9.3	9.7	10.0
Fluridone	2	10.0	9.0	10.0
Check	-	4.7	6.3	6.3

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control. Treated 4/16/78. Evaluated 12/19/78

<u>The effect of injecting 3 preemergence herbicides in young drip irrigated pistachio, almond, peach, and pear trees</u>. Schlesselman, J. and A. Lange. Herbicides have been successfully injected through emission systems for weed control. Little has been done on the effects of herbicides applied directly to the entire root system as would be done with drip irrigation. The objective of the work is to determine the effect of this type of herbicide application in tree growth.

On 6/1/78, herbicide suspensions were made and applied to the root media in 10L per 30 liter cement pot. The herbicides were retreated again at 25 ppm in 10L of water 7/20/78 and 9/1/78. The pots were rated for vigor and weed control on 9/30/78.

The results suggest that EPTC (Eptam), one of the most effective herbicides for injection, was phytotoxic to almond, peach, and pistachio and somewhat less to pear. Napropamide (Devrinol) may have affected pears slightly but not the other three species. Oxyfluorfen (Goal) did not affect any of the 3 species.

Table 1
The effect of three herbicides on vigor and weed control in pears, pistachios, almonds and peaches. (425-73-501-100-1-78)

Herbicides	ppm	Average Vigor and Weed Control Ratings[1/] Pear Vigor	Pear W/C	Pistachio Vigor	Pistachio W/C	Almond Vigor	Almond W/C	Peach Vigor	Peach W/C
Oxyfluorfen	25	9.3	9.7	9.0	10.0	9.7	7.7	9.3	10.0
Napropamide	25	7.7	8.0	9.7	7.3	9.7	9.0	9.7	7.7
EPTC	25	7.3	9.7	6.8	8.0	5.0	8.0	6.0	9.3
Check	-	9.7	2.3	9.0	5.0	10.0	6.0	8.3	4.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = dead plants or no weed control and 10 = most vigorous plants or complete weed control. Treated 6/11/78, 7/20/78 and 9/1/78. Evaluated 9/30/78.

Table 2
The effect of 3 herbicides on trunk diameter of almonds, pistachios, pears and peaches. (425-73-501-100-1-78)

Herbicide	ppm	Trunk Diameter[1/] Almond	Pistachio	Pear	Peaches
Oxyfluorfen	25	34.7	30.7	36.7	37.7
Oryzalin	25	30.3	32.7	31.7	36.3
EPTC	25	28.3	30.7	34.3	32.0
Check	—	21.0	32.3	32.3	32.7

[1/] Average of 3 replications. Trunk diameter measured in mm. Treated 6/1/78, 7/20/78, 9/1/78. Evaluated 10/20/78.

Table 3
The effect of 3 herbicides on fresh weight of almonds, pistachios, pears and peaches. (425-73-501-100-1-78)

Herbicide	ppm	Fresh Weights[1/] Almond	Pistachio	Pear	Peaches
Oxyfluorfen	25	1452.8	1634.4	1816.0	2058.1
Oryzalin	25	1165.3	1816.0	1467.9	2148.9
EPTC	25	757.7	1679.8	1483.1	1346.8
Check	—	953.4	1921.9	1558.7	1876.5

[1/] Average of 3 replications. Fresh weight measured in gms. Treated 6/1/78, 7/20/78, 9/1/78. Evaluated 10/20/78.

The effect of postemergence herbicides on the control of winter weeds.

A mixture of common winter annual weeds in the 4-8" stage were sprayed with eight herbicides at two rates each in 100 gpa and a combination treatment 2/17/78. Evaluated one month later (3/14/78), many differences in their effects on weed species can be observed.

Shepherdspurse was best controlled by glyphosate (Roundup), dinoseb (Dinitro) and oxyfluorfen (Goal). Scarlet pimpernil was controlled by most herbicides except bentazon (Basagran) and the lowest rates of phenmidipham (Betenal), bromoxynil (Brominal) and dinoseb. Fiddleneck was controlled by most herbicides in the test except phenmidipham, and the low rates of dinoseb and bentazon.

Pineapple weed was controlled by glyphosate and by amitrole.

Winter grasses were controlled best by glyphosate, paraquat and amitrole.

Cheeseweed was controlled well only by oxyfluorfen at low rates. A few other herbicides showed activity at high rates.

Red maids were controlled by oxyfluorfen, dinoseb and glyphosate.

Filaree was controlled best by oxyfluorfen.

Many of the weed species were not as apparent in the untreated checks as some weeds in the treated plots which were often not apparent until other weeds were eliminated, thus giving the whole experiment a patchwork affect of weeds resistant to specific herbicides.

Table 1. The control of standing weeds with 9 postemergence herbicides. (425-73-501-1-78)

Herbicides	lb/A	Average Weed Control Ratings[1/] Shepherd purse	Scarlet Pimpernil	Fiddle-neck	Pineapple weed	Grass
Phenmidipham	1	6.6	4.3	3.3	0.0	3.0
Phenmidipham	2	3.6	6.0	1.6	0.6	2.0
Bentazon	1	2.3	2.3	2.6	0.6	1.5
Bentazon	2	3.0	5.0	8.0	2.3	1.5
Glyphosate	1	8.0	8.0	10.0	10.0	10.0
Glyphosate	2	10.0	10.0	10.0	10.0	10.0
Bromoxynil	1	1.0	1.0	5.3	0.6	1.0
Bromoxynil	2	8.6	6.6	9.6	5.0	2.0
Amitrole	1	9.3	9.3	8.3	8.3	9.5
Amitrole	2	10.0	10.0	8.6	10.0	8.5
Oxyfluorfen	½	8.3	10.0	8.3	2.0	3.5
Oxyfluorfen	2	7.3	10.0	8.6	6.3	5.0
Oxyfluorfen + X-77	½+½%	6.6	10.0	8.3	4.3	5.0
Oxyfluorfen + X-77	1	10.0	10.0	10.0	6.3	9.5
Oxyfluorfen + X-77	2+½%	10.0	10.0	8.3	5.3	8.0
Paraquat + X-77	1+½%	10.0	10.0	9.6	9.0	7.0
Paraquat + X-77	2+½%	10.0	10.0	10.0	6.6	10.0
Dinoseb + Oil	1½+5*	1.6	5.0	1.6	0.6	2.0
Dinoseb + Oil	5+5	9.3	10.0	10.0	1.6	5.5
Dinoseb + Oil	10+5	10.0	10.0	10.0	8.6	3.0
Oxyfluorfen + Dinoseb	½+1½	9.0	10.0	10.0	5.3	2.5
Oxyfluorfen + Dinoseb	½+2½	10.0	10.0	10.0	10.0	6.5
Check	-	1.6	1.3	0.0	0.0	0.0

[1/] Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 2/17/78. Evaluated 3/14/78.

* Gallons

Table 2. The control of standing weeds with 9 postemergence herbicides. (425-73-501-1-78)

Herbicides	lb/A	Average Weed Control Ratings[1] Cheeseweed	Redmaids	Filaree	Marestail	Chickweed
Phenmidipham	1	3.0	5.6	0.0	5.3	10.0
Phenmidipham	2	1.6	1.2	0.0	5.0	7.6
Bentazon	1	2.0	2.3	4.0	2.3	4.0
Bentazon	2	1.3	4.0	8.0	8.3	10.0
Glyphosate	1	3.6	7.6	4.3	9.3	10.0
Glyphosate	2	3.3	10.0	7.0	10.0	10.0
Bromoxynil	1	0.6	1.3	0.0	1.0	3.3
Bromoxynil	2	2.0	8.0	0.0	8.3	9.3
Amitrole	1	7.3	7.0	5.6	8.6	10.0
Amitrole	2	9.0	10.0	7.6	10.0	10.0
Oxyfluorfen	½	8.6	10.0	7.6	6.0	10.0
Oxyfluorfen	1	9.0	10.0	9.0	3.3	10.0
Oxyfluorfen	2	10.0	10.0	8.3	9.0	8.3
Oxyfluorfen + X-77	½+¼%	10.0	10.0	7.6	6.0	6.6
Oxyfluorfen + X-77	1+¼%	10.0	10.0	10.0	8.6	9.0
Oxyfluorfen + X-77	2+¼%	10.0	10.0	10.0	9.0	9.3
Paraquat + X-77	1+¼%	3.0	10.0	6.3	10.0	10.0
Paraquat + X-77	2+¼%	2.0	10.0	8.6	10.0	10.0
Dinoseb + Oil	1½+5*	0.3	4.0	1.6	3.3	10.0
Dinoseb + Oil	5+5	1.6	10.0	8.6	8.3	9.0
Dinoseb + Oil	10+5	5.3	10.0	8.0	10.0	10.0
Oxyfluorfen + Dinoseb	½+1½	10.0	10.0	8.0	7.6	10.0
Oxyfluorfen + Dinoseb	½+2½	10.0	10.0	10.0	10.0	10.0
Check	-	1.6	1.6	0.0	1.6	5.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 2/17/78. Evaluated 3/14/78.

* Gallons

Table 3. The control of standing weeds with 9 postemergence herbicides. (425-73-501-1-78)

Herbicides	lb/A	Average Weed Control Ratings[1] Cheeseweed	Mare's tail	Red Maids	Filaree	Pineapple Weed	Annual Bluegrass
Phenmidipham	1	2.0	4.7	3.3	1.0	0.7	5.3
Phenmidipham	2	2.0	4.0	0.7	1.3	0.3	7.7
Bentazon	1	2.7	5.3	2.0	2.0	1.0	7.3
Bentazon	2	2.0	7.0	1.0	8.0	1.7	8.7
Glyphosate	1	1.3	10.0	5.3	3.3	10.0	9.3
Glyphosate	2	2.0	10.0	8.0	5.3	10.0	10.0
Bromoxynil	1	2.0	5.7	3.3	0.7	2.0	6.3
Bromoxynil	2	2.7	7.0	5.0	1.7	2.3	6.0
Amitrole	1	8.0	10.0	7.3	7.7	10.0	8.0
Amitrole	2	9.3	10.0	8.3	8.3	9.3	9.3
Oxyfluorfen	½	7.3	1.3	10.0	6.3	1.0	6.3
Oxyfluorfen	1	10.0	1.0	10.0	5.3	1.7	5.7
Oxyfluorfen	2	10.0	3.7	10.0	7.7	4.3	7.3
Oxyfluorfen + X-77	½+¼%	9.0	3.7	10.0	6.7	2.3	7.7
Oxyfluorfen + X-77	1+¼%	10.0	3.3	9.3	9.0	3.0	8.0
Oxyfluorfen + X-77	2+¼%	10.0	5.3	10.0	8.0	4.7	8.3
Paraquat + X-77	1+¼%	2.7	10.0	10.0	3.3	9.3	10.0
Paraquat + X-77	2+¼%	2.0	10.0	10.0	6.7	7.7	10.0
Dinoseb + Oil	1½+5*	1.7	5.3	3.0	0.7	1.0	6.0
Dinoseb + Oil	5+5	2.0	6.7	10.0	4.7	2.0	3.7
Dinoseb + Oil	10+5	1.7	8.7	10.0	4.7	5.0	8.7
Oxyfluorfen + Dinoseb	½+1½	9.3	2.7	10.0	6.3	3.7	8.3
Oxyfluorfen + Dinoseb	½+2½	9.3	6.7	10.0	9.0	7.3	8.0
Check	-	1.7	2.0	1.7	0.3	0.0	5.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 2/17/78. Evaluated 3/22/78.

* Gallons

The effect of additives to oxyfluorfen (Goal) on the control of cheeseweed.

Although cheeseweed is controlled by 1-2 lb/A of oxyfluorfen (Goal) it is not as effective on large weeds as small. The objective of this experiment was to evaluate the activity of oxyfluorfen with additions of X-77, 2,4-D or propanil at low rates. Several combinations were applied.

The results of low rates show that adding X-77 was as effective as adding low rates of 2,4-D or propanil.

The effect of adding a surfactant, propanil and 2,4-D to low rates of oxyfluorfen on the foliage of cheeseweed. (425-73-501-2-78)

Herbicides	lb/A	Average[1] Cheeseweed Control
Oxyfluorfen + Propanil	1/16+1/4	3.7
Oxyfluorfen + Propanil	1/8+1/2	5.0
Oxyfluorfen + 2,4-D	1/16+1/4	5.7
Oxyfluorfen + 2,4-D	1/8+1/2	7.0
Oxyfluorfen + X-77	1/16+1/2%	2.0
Oxyfluorfen + X-77	1/16+1/4%	3.0
Oxyfluorfen + X-77	1/8+1/2%	6.3
Oxyfluorfen + X-77	1/8+1/4%	3.0
Check	-	1.7

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant. Treated 3/21/78. Evaluated 3/28/78.

Effect of time between herbicide application and incorporation by sprinkler irrigation on the acticity of 7 preemergence herbicides.

Many preemergence herbicides must be incorporated by sprinkler irrigation or rainfall in order to be activated and give long lasting weed control in perennial crops such as almonds. The question may arise on how long can a preemergence herbicide remain on the soil surface without being incorporated and still have sufficient residual activity.

A trial was established on 10/15/76 at the Kearney Horticultural Field Station, Parlier, in a Hanford sandy loam with

58% sand, 32% silt, 10% clay and 0.6% organic matter. Seven herbicides were applied at set intervals prior to irrigation; 4 weeks (10/15/76), 2 weeks (10/29/76), 1 week (11/5/76) and the same day of sprinkler irrigation (11/11/76). All plots were then irrigated with 1" of rainfall which fell between 11/11 to 11/15.

Table 1 shows the results of the first evaluation taken on 3/21/77. The activity of several herbicides was gradually reduced as time increases between application and incorporation but all herbicides are still effective (commercially acceptable weed control = 7.0) even without being incorporated until 4 weeks. Norflurazon (Solicam) and fluridone (EL-171) are still 100% effective after remaining on the soil surface 4 weeks.

By the time 9 months had passed since establishing the trial, several herbicides were beginning to show considerable breakdown the longer they had remained on the soil surface without being incorporated (Table 2). Oxadiazon (Ronstar) was sufficiently active if incorporated within 1 week of application. Prodiamine (Rydex), oryalin (Surflan) and napropamide (Devrinol) looked their best if sprinkler incorporated within 2 weeks, even though napropamide's activity was quite variable. There was no sharp dropoff in the activity of oxyfluorfen (Goal), just a gradual reduction as time progressed. Fluridone was still 100% effective throughout. Norflurazon's activity was excellent with a slight reduction of activity if left on the soil surface 4 weeks.

The final evaluation was made 20 months after the trial was established. Table 3 shows napropamide and oxyfluorfen to be the least stable, requiring incorporation within 1 week for best residual activity. Oxadiazon had lost most of its effectiveness irregardless of when it was incorporated. Prodiamine appears most active if incorporated within 2 weeks after application. Norflurazon and oryzalin still possessed sufficient activity when left on the surface 4 weeks. As may be expected at the 4 lb/acre rate, fluridone remained 100% effective throughout the 4 week period.

A pound for pound comparison on surface stability of these 7 herbicides shows quite a difference in activity. The major point to bring out is that with most preemergence herbicides, the sooner the incorporation after application, the better activity that can be expected.

Table 1. Comparison of 7 preemergence herbicides based on time between application and irrigation by their activity on ryegrass. (425-73-506-9-76)

		Phytotoxicity[1] Weeks Between Application & Irrigation			
Herbicide	lb/A	0	1	2	4
Napropamide	4	9.8	8.3	8.3	7.0
Norflurazon	4	10.0	10.0	10.0	10.0
Oryzalin	4	9.4	9.0	8.0	8.3
Oxadiazon	4	10.0	9.0	10.0	9.6
Fluridone	4	10.0	10.0	10.0	10.0
Prodiamine	4	9.0	9.5	8.0	7.3
Oxyfluorfen	4	10.0	9.4	9.9	9.6
Check	-	0.9			

[1] Average of 4 replications where 0 = no effect, 10 = complete kill of plants.
Treated 10/15/76, 10/29/76, 11/5/76 and 11/11/76.
Seeded 12/10/76.
Evaluated 3/21/77.

Table 2. The effect of time between herbicide application and incorporation by sprinkler irrigation on residual activity. (425-73-506-9-76)

		Average Phytotoxicity[1]			
Herbicide	lb/A	0 weeks	1 week	2 weeks	4 weeks
Napropamide	4	6.2	5.8	3.2	7.2
Norflurazon	4	10.0	9.5	10.0	9.0
Oryzalin	4	10.0	10.0	7.5	8.8
Oxadiazon	4	7.5	4.2	4.8	4.5
Fluridone	4	10.0	10.0	10.0	10.0
Prodiamine	4	9.8	9.2	7.5	8.2
Oxyfluorfen	4	9.2	8.2	8.0	7.0
Check	-				1.4

[1] Average of 4 replications where 0 = no effect, 10 = complete kill of milo plant.
Treated 10/15/76, 10/29/76, 11/5/76, 11/11/76.
Irrigated 11/12/76.
Evaluated 7/26/77.

Table 3. The effect of time between herbicide application and incorporation by sprinkler irrigation on milo. (425-73-506-9-76)

Herbicides	lb/A	Phytotoxicity[1] 0 weeks	1 week	2 weeks	4 weeks
Napropamide	4	4.0	1.2	2.2	3.8
Norflurazon	4	9.8	8.5	8.8	7.0
Oryzalin	4	9.0	8.2	8.2	8.5
Oxadiazon	4	2.8	2.5	1.8	3.2
Fluridone	4	10.0	10.0	10.0	10.0
Prodiamine	4	6.5	7.0	3.0	7.0
Oxyfluorfen	4	7.8	5.0	4.5	4.5
Check	-	1.0			

[1] Average of 4 replications where 0 = no effect, 10 = complete kill.
Treated 10/15/76, 10/29/76, 11/5/76, 11/11/76.
Evaluated 6/23/78.

Effect of initial irrigation on the activity of preemergence herbicides.

Since it has been established that many preemergence herbicides require rainfall or sprinkler irrigation soon after application to give the best activity, it would be important to know how much of this initial irrigation is necessary to insure the maximum benefits from using these herbicides.

On 8/3/76, a trial was established using a rain simulator which ran on a 20' track and would apply a precise amount of water over several 5 ft wide plots. These 20' x 5' plots were subdivided into 5' x 5' subplots allowing room for 3 herbicides along with an untreated check. There were enough plots in this experiment to have 4 levels of initial irrigation (no water, 1/8", 1/2", 2"), all replicated 4 times. The trial was located at the Kearney Horticultural Field Station, Parlier, in Hanford sandy loam with 42% sand, 49% silt, 9% clay and 0.7% organic matter. The 3 herbicides used were napropamide (Devrinol), norflurazon (Solicam) and oryzalin (Surflan), all at 4 lb/A. Immediately following herbicide application, the rain simulator administered the proper initial irrigation levels. No further irrigations were made for 1 month.

On 9/2/76, the trial was seeded with 4 test crops (alfalfa, sugar beets, millet and milo), and sprinkler irrigated.

The evaluation made on 10/13/76 (Table 1) shows napropamide needed 1/8" initial irrigation to give adequate activity. Oryzalin, although activity was good without any initial irrigation, showed quite an increase with just 1/8" initial irrigation. Norflurazon was still 100% effective on the test crops even without any initial irrigation. From these results at 2 months, it could be concluded that the more initial irrigation, the better the herbicide activity.

By the time 8 months had passed, the overall activity of the herbicides had obviously decreased (Table 2). Norflurazon's activity still increased with an increase in the amount of initial irrigation. Both napropamide and oryzalin increased their activity up to the 1/2" initial irrigation level, but there was a sharp decrease in activity, especially with napropamide, at the 2" level. There is the possibility that the 2" initial irrigation level diluted the herbicides or moved the herbicides out of the zone of germination of the test plants which resulted in shorter residual herbicide activity.

Table 3 shows the residual activity at 1 year with little napropamide remaining, but the greatest activity at the 1/2" initial irrigation level. Oryzalin's activity is rather poor without any initial irrigation, but still good with 1/8" and slightly better with more irrigation. Norflurazon showed good activity without any irrigation and considerably more activity as the initial irrigation is increased.

The final evaluation taken 7/26/78 shows very little activity remaining with napropamide or oryzalin, but 1/2" initial irrigation still resulted in the best residual activity (Table 4).

After 2 years, norflurazon was still more active than the other 2 herbicides and there was no indication that too much water, at least with our highest level tested, reduced residual activity.

This study shows there is an optimum level of initial irrigation, immediately following herbicide application, for maximum residual activity with some herbicides. This optimum was around 1/2", and more initial irrigation seemed to dilute out or move the herbicide front out of the weed germination zone, thus shortening its residual life.

Table 1. Effect of initial irrigation on the activity of 3 preemergence herbicides after 2 months. (425-73-506-6-76)

Herbicide	lb/A	Phytotoxicity[1] 0"	1/8"	1/2"	2"
Napropamide	4	4.7	7.9	8.1	8.7
Norflurazon	4	10.0	9.95	10.0	10.0
Oryzalin	4	7.5	8.5	9.4	9.7
Check	-	0.0	0.0	0.0	0.0

[1] Average phyto of alfalfa, sugar beets, milo and millet with 4 replications where 0 = no effect, 10 = complete kill.
Treated 8/3/76.
Seeded 9/2/76.
Evaluated 10/13/76.

Table 2. Comparison of 3 preemergence herbicides with varying amounts of initial irrigation. (425-73-506-6-76)

Herbicide	lb/A	Phytotoxicity[1] 0"	1/8"	1/2"	2"
Napropamide	4	6.3	6.1	6.6	5.0
Norflurazon	4	7.5	8.3	9.0	9.1
Oryzalin	4	7.0	8.3	8.4	7.5
Check	-	1.7	2.5	1.7	1.9

[1] Average phyto of alfalfa, sugar beets, barley and ryegrass with replications where 0 = no effect, 10 = complete kill of plants.
Treated 8/3/76.
Reseeded 12/10/76.
Evaluated 4/4/77.

Table 3. Effect of initial irrigation on the residual activity of 3 preemergence herbicides 1 year after application. (425-73-506-6-76)

Herbicide	lb/A	Phytotoxicity[1] 0"	1/8"	1/2"	2"
Napropamide	4	2.3	3.6	4.9	2.3
Norflurazon	4	7.7	8.5	9.5	9.6
Oryzalin	4	4.8	7.7	8.1	8.0
Check	-	2.5	2.6	2.8	2.4

[1] Average phyto of alfalfa, sugar beets, milo and millet with 4 replications where 0 = no effect, 10 = complete kill of plants.
Treated 8/3/76.
Reseeded 6/20/77.
Evaluated 7/14/77.

Table 4. Effect of initial irrigation on the activity of 3 preemergence herbicides 2 years after application. (425-73-506-6-76)

Herbicide	lb/A	Phytotoxicity[1] 0"	1/8"	1/2"	2"
Napropamide	4	1.7	2.8	2.9	2.0
Norflurazon	4	3.7	4.8	5.4	6.3
Oryzalin	4	2.6	4.3	4.7	3.1
Check	-	1.9	1.7	2.0	2.1

[1] Average phyto of milo, millet and sugar beets with 4 replications where 0 = no effect, 10 = complete kill of plants.
Treated 8/3/76.
Reseeded 6/2/78.
Evaluated 7/26/78.

The effect of initial irrigation on the activity of oxyfluorfen.

The initial activity and subsequent residual activity of preemergence herbicides is often determined by the amount and timing of the initial irrigation. The objective of this field experiment was to determine the optimum amount of water to activate oxyfluorfen. The herbicide was applied

to a hot dry prepared soil surface on 7/18/78 in a volume of 100 gals/A. The main plots were 5' x 20' and the sub-plots 5' x 5'. Each treatment was replicated 3 times. The soil was a Hanford fine sandy loam (O.M. 0.7%, sand 42%, silt 49% and clay 9%). The varying amounts of water (1/8, 1/2 and 2") were applied immediately after application. No water was added for one month. On 8/18/78, the plots were seeded to cotton, sorghum and sugar beets and sprinkler irrigated uniformly.

On 8/27/78 and 10/13/78 the crops were rated for vigor. The lowest level of water (1/8") appeared to cause the least amount of phytotoxicity and the most vigorous cotton plants. However, the crusting effect from higher amounts of water seen with cotton (check) plots in the 8/27/78 evaluation probably masked any difference due to initial irrigation. However, the sorghum (milo) in the checks was not affected by the amount of water and, therefore, suggested greater relative injury (i.e. less vigorous) at the lower amount of water. These results would suggest that 1/8" of initial irrigation was satisfactory for activating oxyfluorfen in a Hanford fine sandy loam.

Table 1

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

		Average Vigor Ratings[1/]								
		1/8"			1/2"			2"		
Herbicides	lb/A	Cotton	Milo	Sugar Beet	Cotton	Milo	Sugar Beet	Cotton	Milo	Sugar Beet
Oxyfluorfen	1	9.7	4.3	3.3	7.7	5.7	0.7	8.7	6.3	1.0
Oxyfluorfen	2	7.7	2.3	0.3	7.0	1.7	0.0	8.0	3.7	0.3
Oxyfluorfen	4	5.0	0.3	0.0	3.7	0.0	0.0	4.0	0.3	0.0
Check	-	9.0	9.3	9.3	9.0	9.3	7.7	8.7	10.0	8.3

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no stand and 10 = largest plants and best stand. Treated and initial irrigation - 7/18/78. Seeded and uniform irrigation - 8/18/78. Evaluated 10/13/78.

Bermudagrass control in a mature almond orchard. Schlesselman, J. T., G. Massey and A. H. Lange.

A heavy bermudagrass infested orchard was treated with four herbicides in 1200 ft plots down the tree row, i.e., to the centers, that is two rows and centers at a time. The area adjacent to the even rows was disked 4-5" deep with an orchard disk. This procedure was followed on 11/17/76 and again on 3/31/78. The plots were rated prior to the second treatment on 3/24/78 and again after the second treatment on 9/20/78.

The results show that substantial bermudagrass control was obtained from both surface (preemergence) applications and from incorporation with a disk. The dinitroanaline herbicides appeared slightly better than norflurazon (Solicam). Continuous use of these herbicides for annual weed control could be expected to give measurable bermudagrass control.

The effect of four preemergence herbicides on the control of bermudagrass in a mature almond orchard. (425-10-502-146-1-77)

Herbicides[2]	lb/A	Approximate[1] Bermuda Control 3/24/78 No Inc.	3/24/78 Disk	9/20/78 No Inc.	9/20/78 Disk
Prodiamine	4	9	7	7	9
Oryzalin	4	6	6	7	8
Trifluralin	4	5	6	8	8
Norflurazon	4	5	7	8	8
Napropamide 1977, oryzalin 1978	4	7	7	8	3
Untreated	-	6	-	0	-
Untreated 1977, prodiamine 1978	4	-	4	-	10
Prodiamine	4	7	9	10	10
Prodiamine	8	8	9.5	10	10
Prodiamine	8	9	9	10	10
Trifluralin 1978	4	8	7	10	10
Untreated 1977, trifluralin 1978	4	7	4	10	10

No phytotoxicity was observed from these 1200 ft plots of twelve year old almonds growing in a Delhi loamy sand with flood irrigation.

[1] This is an approximate evaluation of the control down the entire row.

[2] Herbicides applied 11/17/76 and 3/31/78 by a 10 ft boom on each side of the tree row.

The timing of norflurazon (Solicam) applications to obtain optimum weed control in a mature almond orchard.

Lange, A. H., J. T. Schlesselman, L. J. Nygren and G. Massey.

An herbicide is only as good as its activity against the weed population where it's applied. The characteristics of the herbicide itself is but one facet in determining how that chemical will perform. Environmental factors also play an important part in the overall effectiveness of the herbicide (i.e., when it is the best time to apply an herbicide to get the best results and how much rain is needed and how soon after application should it fall to incorporate the herbicide for long term activity).

A trial was established in Fresno County in a 9 year old Mission and Nonpariel almond orchard. Norflurazon at 2, 4 and 6 lb/acre were all applied on 11/18/76, with the rates again applied to other sets of plots at six week intervals (12/30/76 and 2/10/77). This was an attempt to determine the optimum time during the winter months to apply norflurazon in order to obtain the best possible bermudagrass control in the spring.

Table 1 shows the best overall bermudagrass resulted from the plots treated on 12/20/76. However, late December may not be the best time to apply norflurazon in successive years. The precipitation records showed the winter of 1976-77 to be one of the worst droughts in California history, with storms few and far between. Within 24 hours after the 12/30/76 application, .71" of rain fell on the plots. Significant rainfall did not fall for at least 1 month following the other 2 application dates, which may have reduced the overall effectiveness of the herbicide after these applications.

The plots were retreated the following year beginning on 2/14/78 and at one month intervals (3/16/78 and 4/14//8) to determine if timing of herbicide applications from late winter to early spring would effect the growth of bermudagrass as it ended it's dormant period.

The latest evaluation taken 10/13/78 shows very little difference in norflurazon controlling annual weeds and bermudagrass, irregardless of date of application or even the rate used (Table 2). Again, a look at the precipation record for Fresno County shows significant amounts of rain soon after each treatment date, which could explain the similarities in the ratings.

At no time during this experiment has any phytotoxicity been observed to the almond trees as a result of using norflurazon.

Other work in the past has also indicated very little differences in just when a preemergence herbicide is applied during the winter months. More often the differences with long term residual herbicides occur as a result of what happend to the herbicide, rainfall wise after if has been applied.

Table 1. Bermudagrass control in an almond orchard by timing herbicide applications 6 weeks apart. (425-10-502-146-2-77)

Herbicides	lb/A	Bermuda Control[1/] Treatment Dates Early 11/18/76	Mid 12/30/76	Late 2/10/77
Norflurazon	2	7.3	8.0	5.0
Norflurazon	4	7.8	8.5	6.0
Norflurazon	6	8.8	8.5	7.3
Check	-	-	8.8	-

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Evaluated 3/30/77.

Table 2. Effect of timing norflurazon (Solicam) applications for optimum weed control in a mature almond orchard. (425-10-502-146-2-77)

Herbicides	lb/A	Annual W/C[1/] Application Dates Early	Mid	Late	Bermuda Control[1/] Application Dates Early	Mid	Late
Norflurazon	2	9.0	8.8	8.5	9.0	8.5	8.5
Norflurazon	4	8.5	8.8	9.3	8.8	9.8	9.5
Norflurazon	6	9.3	7.5	8.0	8.5	7.5	9.3
Check	-		6.0			8.5 2/	

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control. Treated: Early - 11/18/76, 2/14/78; Mid - 12/30/76, 3/16/78; Late - 2/10/77, 4/14/78. Evaluated 10/13/78.

2/ Due to grower interference with the plots.

Two months after the trial was established, an evaluation was made to determine the effectiveness of these herbicides on the regrowth of bermudagrass. From observing the check plots, it was apparent that insufficient regrowth was not available for a good 1978 evaluation. However, the bermudagrass that was present did indicate that trifluralin and prodiamine did the best job in controlling this perennial weed. A spring 1979 evaluation of the bermudagrass will be necessary to obtain more meaningful results of this trial.

Bermudagrass control in almonds using 4 incorporated dinitroanaline herbicides. (425-20-502-146-10-78)

Herbicides	lb/A	Bermuda Control[1/]
Trifluralin	4	7.7
Profluralin	4	4.3
Prodiamine	4	7.7
Oryzalin	4	5.0
Check	-	5.3

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 6/20/78. Evaluated 8/29/78.

Incorporating dinitroanaline herbicides for bermudagrass control in almonds. Vargas, R., J. T. Schlesselman and A. H. Lange.

A 2 year old almond orchard, infested with bermudagrass, was treated overall with 4 dinitroanaline herbicides on 6/20/78. Immediately following application, the herbicides were mechanically incorporated to a 4" depth by a side mounted, PTO driven "Under Tree Hoe" cultivator, which incorporated the herbicides within a few inches of the tree trunks. The centers were also incorporated to a depth of 4 inches with a tractor mounted Howard ® rototiller. The check plots were also tilled in the same manner.

Comparison of 3 postemergence herbicides alone and in combination with oryzalin (Surflan) for weed control in almonds. Elmore, C. and R. Mullen.

On 10/14/76, 3 postemergence herbicides were applied alone and in combination with oryzalin on bermudagrass in a Nonpariel and Merced almond orchard in San Joaquin County. The plots were 28' x 10' with 4 replications (2 for each almond variety).

Evaluated 3/9/77, the best bermuda control was obtained with glyphosate (Roundup) at 4 lb/acre; with the 2 lb/acre rate still giving good control

(Table 1). The addition of oryzalin did little to enhance the control of bermuda with any of the treatments. Excellent shepherdspurse and clover control was obtained with all treatments. No herbicide treatment satisfactorily controlled filaree.

Oryzalin was retreated on 3/18/78 and again on 2/21/78. Dalapon (Dowpon), glyphosate and paraquat (Paraquat) were retreated on 6/2/77.

The evaluation made on 6/1/78 showed that the spring application of these postemergence herbicides to bermuda was not as effective as the fall application (Table 2). Satisfactory control of dandelion was obtained by all treatments except paraquat. All treatments which included oryzalin were nearly 100% effective against crabgrass. Very good lambsquarter control was obtained with all treatments. No phytotoxicity to the almond trees was observed with any treatment.

Table 1. Effect of 3 herbicides alone and in combination with oryzalin (Surflan) in controlling 4 weed species. (425-502-118-39-1-76)

Herbicides	lb/A	Average Weed Control[1/] Bermuda	Shepherds Purse	Filaree	Clover
Dalapon	4	4.8	9.2	5.2	10.0
Dalapon + Oryzalin	4 + 4	5.0	9.0	5.5	10.0
Glyphosate	1	6.5	9.5	5.2	9.8
Glyphosate + Oryzalin	1 + 4	6.8	9.2	6.0	9.5
Glyphosate	2	8.2	9.0	6.5	9.5
Glyphosate + Oryzalin	2 + 4	5.2	10.0	6.0	10.0
Glyphosate	4	9.8	10.0	6.5	10.0
Glyphosate + Oryzalin	4 + 4	8.0	10.0	6.8	10.0
Paraquat + Oryzalin	1 + 4	6.5	9.5	5.8	9.8
Paraquat	1	7.0	9.0	6.5	10.0

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control. Treated 10/14/76. Evaluated 3/9/77.

Table 2. Activity of 3 herbicides alone and in combination with oryzalin (Surflan) on 4 weed species. (425-502-118-39-1-76)

Herbicides	lb/A	Average Weed Control[1/] Bermuda	Dandelion	Crab-grass	Lambs-quarter
Dalapon	4	2.2	7.0	4.8	8.2
Dalapon + Oryzalin	4 + 4	5.0	7.2	10.0	10.0
Glyphosate	1	4.5	7.2	4.5	8.0
Glyphosate + Oryzalin	1 + 4	6.2	8.2	10.0	10.0
Glyphosate	2	6.2	6.0	4.5	8.2
Glyphosate + Oryzalin	2 + 4	6.5	7.0	9.8	10.0
Glyphosate	4	6.2	7.0	4.8	8.8
Glyphosate + Oryzalin	4 + 4	8.0	8.5	10.0	10.0
Paraquat + Oryzalin	1 + 4	5.0	7.8	10.0	10.0
Paraquat	1	2.0	6.5	4.5	9.8

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control. Treated 10/14/76. Retreated oryzalin - 3/18/77, 2/21/78; dalapon, glyphosate, paraquat - 6/2/77. Evaluated 6/1/78.

Effect of 3 herbicides alone and in combination in a mature almond orchard.
Elmore, C. and D. M. Holmberg.
On 10/29/76, dalapon (Dowpon), glyphosate (Roundup) and oryzalin (Surflan) were applied alone and in combination to a 10 year old Mission and Thompson almond orchard in Solano County in a silty loam soil. The plots were 22' x 10' with 3 replications. Oryzalin was retreated on 6/28/77 and 1/9/78. Dalapon and glyphosate were reapplied on 8/23/77. Paraquat was applied to all plots on 4/13/78.

Table 1 shows the best treatments in controlling bermuda were glyphosate at 4 lb/acre and the combinations of glyphosate and oryzalin at 2 + 4 lb/acre and 4 + 4 lb/acre.

Best annual weed control was obtained with oryzalin, irregardless of whether it was applied alone or in combination with dalapon or glyphosate.

No phytotoxicity was observed to any of the almond trees.

Table 1. Effect of 3 herbicides alone and in combination on bermudagrass. (425-502-146-48-3-76)

Herbicides[2]	lb/A	Bermudagrass Control[1] 4/13/78	5/25/78	6/19/78
Dalapon	4	6.0	4.3	4.3
Dalapon + Oryzalin	4 4	5.7	5.5	3.3
Glyphosate	1	7.2	7.1	6.3
Glyphosate + Oryzalin	1 4	6.0	4.0	4.0
Glyphosate	2	6.3	6.0	4.7
Glyphosate + Oryzalin	2 4	10.0	9.3	8.3
Glyphosate	4	9.3	9.0	9.0
Glyphosate + Oryzalin	4 4	10.0	10.0	9.1
Oryzalin	4	2.7	1.0	1.7
Check	-	1.0	0.0	1.3

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control.

2/ Treated 10/29/76. Retreated oryzalin - 6/28/77, 1/9/78; dalapon, glyphosate - 8/23/77; paraquat (all plots) - 4/13/78.

Table 2. Activity of 3 herbicides alone and in combination on chickweed and shepherds purse. (425-502-146-48-3-76)

Herbicide[2]	lb/A	Weed Control[1] Chickweed 1/9/78	4/13/78	Shepherds Purse 1/9/78	4/13/78
Dalapon	4	2.0	3.3	8.3	6.0
Dalapon + Oryzalin	4 4	9.0	10.0	9.0	9.0
Glyphosate	1	2.0	4.7	7.7	7.3
Glyphosate + Oryzalin	1 4	8.7	10.0	8.7	9.0
Glyphosate	2	2.0	6.3	9.0	7.7
Glyphosate + Oryzalin	2 4	8.3	9.7	8.7	7.3
Glyphosate	4	2.7	3.3	8.3	5.7
Glyphosate + Oryzalin	4 4	8.3	9.9	9.0	9.9
Oryzalin	4	9.0	9.7	8.7	9.0
Check	-	3.3	3.7	8.3	7.3

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no control and 10 = complete weed control.

2/ Treated 10/29/76. Retreated oryzalin - 6/28/77, 1/9/78; dalapon, glyphosate - 8/23/77.

Table 3. Effect of 3 herbicides alone and in combination on malva and annual grass (425-502-146-48-3-76)

Herbicides[2]	lb/A	Weed Control[1] Malva 1/9/78	4/13/78	Annual Grasses 1/9/78	4/13/78
Dalapon	4	7.7	5.0	4.3	3.3
Dalapon + Oryzalin	4 4	9.3	10.0	7.3	9.7
Glyphosate	1	8.3	6.7	4.3	2.7
Glyphosate + Oryzalin	1 4	9.0	10.0	8.3	10.0
Glyphosate	2	7.3	6.7	4.3	2.7
Glyphosate + Oryzalin	2 4	9.7	10.0	8.0	9.9
Glyphosate	4	8.0	7.0	4.3	2.3
Glyphosate + Oryzalin	4 4	9.3	10.0	7.7	9.9
Oryzalin	4	9.7	10.0	5.3	9.7
Check	-	8.0	6.0	5.3	3.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no control and 10 = complete weed control.

2/ Treated 10/29/76. Retreated oryzalin - 6/28/77, 1/9/78; dalapon, glyphosate - 8/23/77.

The effect of 7 herbicides on bermudagrass control.

Seven herbicides were applied to a heavy stand of bermudagrass on 8/29/78 to compare the effectiveness of some newly released numbered compounds to a standard such as glyphosate (Roundup). Ethephon (Ethrel) at 5,000 ppm was sprayed on 2 sets of plots (8/22/78), one week prior to applying glyphosate to determine if such a growth regulator would enhance the control of bermudagrass. The plots were 10' x 5' with 4 replications.

The evaluation taken on 9/18/78 shows that only glyphosate at 3 lb/A satisfactorily controlled this heavy stand of bermudagrass and the addition of ethephon one week prior to the glyphosate treatment did little in improving control.

The effect of 7 herbicides on bermudagrass control. (425-73-502-1-78)

Herbicide	lb/A	Ave. Control[1] Bermudagrass
Glyphosate	1-1/2	4.2
Glyphosate+Ethephon	1-1/2+5000 ppm	4.5
Glyphosate	3	7.0
Glyphosate+Ethephon	3+5000 ppm	7.2
MBR-18337	1-1/2	4.2
MBR-18337	3	2.2
Basf-9021	3	2.8
Basf-9021	6	3.5
Biuret	3	2.5
Biuret	6	1.0
R-40244	1-1/2	5.5
R-40244	3	5.5
Fluridone	1-1/2	4.5
Fluridone	3	4.2
Norflurazon	3	3.0
Norflurazon	6	3.0
Check	-	0.0
Check+Ethephon	- +5000 ppm	0.0

[1] Average of 4 replications. Based on 0 to 10 scale where 0 = no effect, 10 = complete weed control.
Treated 8/29/78. Evaluated 9/18/78.

Comparison of the Micro-Herbi® sprayer vs. conventional sprayer in controlling bermudagrass and johnsongrass.

The Micro-Herbi® is a new type of sprayer designed to increase foliage coverage by significantly reducing the size of spray droplet. It is a hand held device using gravity flow to obtain its pressure and a battery operated spinning disc at the end which delivers the herbicide at a very low volume (< 1 gpa) over a 40" swath with the disc only 8 inches above the ground. This new approach was compared with the conventional CO_2 sprayer using 8002-Tee Jet® nozzles at 50 gpa to determine if this new device would better control bermudagrass and johnsongrass.

On 8/29/78, 10' x 40" plots were marked out in heavy stands of bermudagrass and johnsongrass. Glyphosate at 3 lb/acre was sprayed at 50 gpa with the CO_2.

The Micro-herbi sprayer was used at the recommended rate of 10 oz/2L walking 3 ft/sec which was calculated to be .37 gpa. The Micro-Herbi sprayer was also used at a much slower speed to obtain a 3 lb/acre rate of glyphosate at a volume of 50 gpa for a direct comparison with the conventional CO_2 sprayer, but would be extremely impractical to use commercially from the time standpoint.

The initial evaluation made 9/18/78 showed the conventional CO_2 sprayer to give superior control of bermudagrass and johnsongrass when compared to the Micro-Herbi at the recommended rate of 10 oz/2L. Even though the coverage is theoretically good with the Micro-Herbi, the actual amount of glyphosate which got on the leaf surface was apparently insufficient to give the same control of these heavy stands of perennial weeds. More studies will have to be conducted with the Micro-Herbi in regards to herbicide concentrations and gallonage to determine the practical value of this new weed control tool.

The effect of different rates of glyphosate applied with different sprayers on bermudagrass and johnsongrass control. (425-73-502-2-78)

Herbicide	lb/A	Sprayer	Average[1] Bermuda-grass	Johnson-grass
Glyphosate	3	Herbi @ 50 gpa	8.0	8.7
Glyphosate	10 oz/2L	Herbi @ 0.37 gpa	6.7	6.2
Glyphosate	3	CO_2 @ 50 gpa	8.3	9.2
Check	-	—	2.0	0.7

[1] Average of 3 replications where 0 = no effect, 10 = complete weed control.
Treated 8/29/78. Evaluated 9/18/78.

The use of 2 preemergence herbicides under sprinkler-irrigation in almonds.

An almond orchard, about 5 years old, was treated with simazine (Princep) at 1/4, 1 and 2 lb/acre and norflurazon (Solicam) at 2, 4 and 6 lb/acre on

1/21/77 in a loamy sand soil with 83% sand, 14% silt, 37% clay and 0.41% organic matter. The plots were 48' (2 tree) x 12', replicated three times. The plots were then sprinkler irrigated to incorporate the herbicides.

As reported in the 1977 Almond Research Report (77:6), norflurazon gave excellent control of yellow nutsedge, even at the 2 lb/acre rate. This evaluation made 7/27/77 also showed the 2 and 4 lb/acre rates of simazine to give adequate nutsedge control at 7.7.

Unfortunately the plots were disked several times after 7/27/77 which made further weed control evaluations impossible. Therefore, to determine the residual activity of these herbicides, soil was removed from each plot on 10/28/77, sealed in plastic bags and taken to the Kearney Horticultural Field Station, Parlier. The soil was seeded with broccoli and ryegrass on 12/29/77 and evaluated on 2/12/78, 13 months after treatment. By this time simazine was rather ineffective on ryegrass but was still somewhat active against broccoli. Norflurazon was slightly more effective than simazine on broccoli and ryegrass, however, much higher rates of norflurazon were used.

All plots were retreated on 1/26/78 and by 5/31/78 the plots had received over 12" of rain, nearly tripling what they received during all of 1977. Yet no phytotoxicity was observed on any of the trees, not even with the 6 lb/acre rate of norflurazon in this trial.

The most recent evaluation taken on 10/10/78 showed that all treatments gave good lovegrass control, i.e., norflurazon at 4 and 6 lb/acre were almost 100% effective.

Effect of 2 preemergence herbicides under sprinkler irrigation in almonds. (425-10-502-146-6-77)

Herbicides	lb/A	Phytotoxicity[1] Broccoli 2/12/78	Ryegrass 2/12/78	W/C[2] Lovegrass 10/10/78
Simazine	½	3.0	0.5	9.0
Simazine	1	1.0	0.0	7.3
Simazine	2	0.5	0.0	7.0
Norflurazon	2	1.0	0.5	7.7
Norflurazon	4	3.2	3.5	9.3
Norflurazon	6	2.8	2.5	9.7
Check	-	0.2	0.0	6.7

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant. Treated 1/21/77. Soil removed 10/28/77. Seeded 12/29/77.

2/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 1/21/77 and 1/26/78.

The effect of summer application of postemergence herbicides on bindweed control in an almond orchard.
On June 24, 1977 four postemergence herbicides were applied alone and in combination to bindweed in an almond orchard with a CO_2 backpack. The method of irrigation was furrow. Evaluations for weed control were taken on 10/19/77 and 6/10/78.

The fall rating showed good bindweed control from treatments with glyphosate (Roundup) or 2,4-D (Emulsamine) and the combination. The combination of glyphosate plus Krenite was no better than glyphosate alone. The treatments showed no detrimental effect on almond growth.

Table 1. The effect of postemergence herbicides on the control of bindweed and almond vigor. (425-24-502-146-1-77)

Herbicides	lb/A	Average Ratings[1/] Bindweed Control	Almond Vigor
Glyphosate	3	8.0	10.0
Glyphosate	6	9.3	9.7
2,4-D (OSA)	3	7.3	9.0
Glyphosate + 2,4-D	1½+1½	10.0	10.0
Krenite	6	3.3	9.3
Krenite	12	7.3	8.3
Glyphosate + Krenite	3+3	6.3	7.7
Glyphosate + Krenite	3+6	8.5	9.0
Check	-	1.3	8.3

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control or most vigorous growth. Treated 6/24/77. Evaluated 10/19/77

Table 2. The effect of summer applications of postemergence herbicides on the control of perennial bindweed in a young almond orchard. (425-24-502-146-1-77)

Herbicide	lb/A	Average[1/] Bindweed Control
Glyphosate	3	7.0
Glyphosate	6	9.3
2,4-D (OSA)	3	8.6
Glyphosate+2,4-D	1-1/2+1-1/2	8.3
Krenite	6	4.6
Krenite	12	7.0
Glyphosate+Krenite	3+3	5.3
Glyphosate+Krenite	6+6	9.0
Check	-	2.3

1/Average of 3 replications where 0 = no effect, 10 = complete weed control.
Treated 6/24/77; evaluated 6/10/78.

Long term effect of preemergence herbicides plus glyphosate for control of silverleaf nightshade.

A trial was established in a mature almond orchard infested with the perennial silverleaf nightshade (white horsenettle) on 6/29/77. The soil was a sandy loam with 60% sand, 23% silt, 17% clay and 1.3% organic matter. Norflurazon (Solicam) at 2 and 4 lb/acre, oxyfluorfen (Goal) at 4 lb/acre and oxfluorfen at 2 lb/acre plus 2,4-D (Emulsamine) at 2 lb/acre were applied postemergence over the entire 72' x 24' plots. This was followed by superimposing glyphosate (Roundup) at 3 lb/acre over 2/3 of each plot.

On 2/1/78, when the nightshade was dormant, norflurazon and oxyfluorfen were again sprayed over their respective plots. Glyphosate and 2,4-D were not reapplied during the summer of 1978.

An evaluation made on 11/8/78 showed norflurazon had given the best silverleaf nightshade control. The addition of glyphosate increased the control of silverleaf nightshade but not enough to warrant it's use especially where 2,4-D can be used. In other studies 2,4-D has been quite effective on silverleaf nightshade. Oxyfluorfen alone and in combination with 2,4-D was no more effective with glyphosate, than glyphosate alone.

Long term effect of preemergence herbicides plus glyphosate on silverleaf nightshade control. (425-15-502-146-1-77)

Herbicide	lb/A	Silverleaf Nightshade Control[1/] 3 lb/A Glyphosate	No Glyphosate
Norflurazon	2	7.5	7.3
Norflurazon	4	8.7	8.5
Oxyfluorfen	4	5.7	5.5
Oxyfluorfen + 2,4-D	2+2	6.7	6.5
Check	-	6.7	4.7

1/ Average of 6 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 6/29/77. Retreated preemergence herbicides 2/1/78. Evaluated 11/8/78.

The effect of repeated applications of 4 postemergence herbicides to the trunks of young almonds.

Since foliar applied herbicides are used after weeds have germinated, it is important to know what effect they will have on young trees if the herbicides are sprayed on the trunks. For

example, under drip irrigation some preemergence herbicides break down in the wet zone around the tree and a contact herbicide must be used around the trees. Two ages of Mission almonds were used to evaluate the safety of repeated trunk applications of postemergence herbicides. In this experiment, herbicides were applied 5/5/77 to 8" of the trunk after first removing any suckers and lower foliage present. These same trunks were retreated 9/21/77 and 9/11/78.

The evaluations made 10/25/77 and 1/13/78 indicate that the trees were relatively unaffected by glyphosate (Roundup) when compared to the check.

The young almonds treated with paraquat (Paraquat) at 8 and 16 lb/acre were displaying increasing symptoms, primarily severe trunk splitting. This splitting cannot be attributed solely to paraquat since an earlier experiment to these trees had resulted in 2,4-D (Emulsamine) at 4 and 8 lb/acre sprayed on the trunks (5/18/76) which may have had a additive effect on these young almonds. The trees treated with paraquat were replaced during the winter 1978 and treated only with paraquat at their respective rates on 9/11/78. By 9/26/78 these newly transplanted almonds were already displaying gumming or sap oozing from the treated trunks.

The 2 year old almonds treated with MSMA (Bueno 6) did show some slight bark splitting by 9/26/78.

The young almonds treated with 2,4-D at 16 lb/acre were killed by 10/25/77 and were replaced during the winter 1978. The new transplants were treated on 9/11/78 and by the 9/26/78 evaluation, very little injury was observed.

The older almond trees (4 year old) were unaffected by any of the trunk sprayings on the evaluations made 10/25/77 and 1/13/78. By the 9/26/78 evaluation there did appear to be some very slight gumming with the high rate of paraquat and some slight bark splitting with MSMA at 16 lb/acre.

Effect of repeated applications to the trunks of almonds with 4 postemergence herbicides. (425-73-502-100-1-77)

		Average Almond Phytotoxicity[1]			
		10/25/77	1/13/78	9/26/78	9/26/78
Herbicides	lb/A	2 Yr Old	2 Yr Old	2 Yr Old	4 Yr Old
Glyphosate	4	2.3	0.0	0.2	0.0
Glyphosate	8	0.3	0.0	0.0	0.0
Glyphosate	16	1.7	2.0	0.0	0.0
Paraquat + X-77[2]	4 .5%	-	-	-	0.0
Paraquat + X-77[2]	8 .5%	2.3	4.7	1.7	0.0
Paraquat + X-77[2]	16 .5%	4.7	6.3	2.0	1.3
MSMA	4	-	-	-	0.0
MSMA	8	2.3	0.0	1.0	0.0
MSMA	16	2.7	0.7	2.0	1.3
2,4-D (OSA)	16	10.0	10.0	8.7	0.0
Check	-	2.3	0.3	0.0	0.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of tree. Treated 5/5/77, 9/21/77, and 9/11/78.
2/ Treated with 2,4-D at 2, 4 and 8 lb/A respectively on 5/18/76.

Effect of simulating herbicide drift onto young almond foliage.

The ever present problem of drift of postemergence type herbicides onto desirable foliage when using particularly systemic herbicides for perennial weed control was studied using four year old Mission almonds. By 3/7/78 the almond trees had leafed out to 1-3 cm and it appeared that these tender shoots should be very susceptible to injury by herbicides such as 2,4-D (Emulsamine), glyphosate (Roundup) and MSMA (Bueno 6). Only 1 branch from each treated tree was used to avoid possible severe injury to the entire tree. This also should have eliminated

any confusion as a result of using 2 branches per tree, each with a different treatment, in case that there was significant movement throughout the tree. Only 10 cm of the flagged branch was treated. Application was by means of a pump type atomizer spraying the equivalent of 50 gpa.

An evaluation made after 3-1/2 weeks showed considerable injury to the treated area with the 3,000 ppm rates of 2,4-D and glyphosate (Table 1). There was very little injury to the foliage treated with the lower rates of 2,4-D. Glyphosate at 300 ppm resulted in more injury than 2,4-D at the same rate, but was considerably less than glyphosate at 3000 ppm. MSMA was the safest of the herbicides tested. There was some lateral movement of the herbicides along the treated branch, but this was restricted to the highest rates. The branches treated with glyphosate at 3000 ppm moved the most, displaying typical symptoms on an average of 2 buds away from the treated area towards the trunk and 5 buds affected towards the terminal end of the branch.

Table 2 shows the evaluation taken on 9/28/78, 6-1/2 months after treating. The high rates of 2,4-D and glyphosate were the most detrimental; glyphosate killing 100% of the treated buds. MSMA showed some phytotoxicity to the treated zone but not nearly as severe as the other herbicides.

Herbicide movement within the treated branch was limited to the high rates of glyphosate and 2,4-D. Movement within the branches treated with 2,4-D at 30 ppm is misleading since only 1 replication in 4 showed any movement at all.

Table 1. The effect on young almond shoots sprayed with dilute amounts of 3 herbicides and on subsequent shoot growth. (425-73-502-146-1-78)

Herbicide	Phytotoxicity[1] 3,000	300	30	3	0.3
2,4-D	7.8	1.8	1.3	0.3	0.0
Glyphosate	9.3	3.3	-	-	-
MSMA	3.0	1.3	-	-	-
Check	0.0				

[1] Average of 4 replications where 0 = no effect, 10 = complete kill.
Evaluated 3/31/78.

Table 2. The effect of leaf spraying on foliage and nodes of the limbs of young Mission almond trees. (425-73-502-146-1-78)

Herbicide	PPM	Phyto to Sprayed Area	Average[1] Movement Toward Trunk (cm)	Movement Toward Tip (cm)
2,4-D	0.3	0.0	0.0	0.0
2,4-D	3.0	1.2	0.0	0.0
2,4-D	30.0	5.0	2.5	1.5
2,4-D	300.0	1.2	0.0	0.0
2,4-D	3000.0	7.5	4.0	4.8
Glyphosate	300.0	3.5	0.0	0.0
Glyphosate	3000.0	10.0	2.5	5.2
MSMA	300.0	0.2	0.0	0.0
MSMA	3000.0	2.2	0.0	0.0
Check	—	0.0	0.0	0.0

[1] Average of 4 replications. Phyto where 0 = no effect, 10 = complete kill of node.
Treated 3/7/78. Rated 9/28/78. Used Windex sprayer covering the area 2" each side of a plastic flag with 50 GPA.

The effect of drift in relation to herbicide, size and spray volume.

The hazard of crop injury as a result of herbicide drift is a problem dependent on such factors as the herbicide used, droplet size and wind. Post-emergence herbicides used in and around almond orchards pose the threat of injury if the conditions are right and aren't recognized by the applicator.

To determine the extent of herbicide injury due to drift, a wind tunnel was constructed using 20" diameter cement pipes laid horizontal along the ground with a fan at one end and openings at 10', 30', 50' and 80' for placing indicator plants. The wind speed within the tunnel averaged 6-1/2 MPH. After the plants were placed at each station, the herbicide was sprayed for a given amount of time, usually 10 sec., into the tunnel in front of the fan. The fan then remained on for 1 minute to allow movement of the herbicide down the tunnel, after which the plants were removed. This was replicated 3 times for each herbicide used.

An evaluation made 2 weeks after treatment showed glyphosate (Roundup) to drift the farthest and showing more injury when compared to 2,4-D (Emulsamine) and paraquat using 8004-Tee Jet® nozzles at 50 gpa. Both glyphosate and paraquat injury was detected at 80' but the paraquat injury was not as severe. The farthest 2,4-D drifted was 50'.

Orifice size has a substantial bearing on drift, as was indicated with 2,4-D. Drift was obviously increased when 8001 nozzles were used, which deliver 1/4 the volume of 8004's, but the droplet size was also reduced. Therefore, to obtain the same rate of 2 lb/acre at 50 gpa, spraying time had to be increased 4 times to 40 seconds. When gallonage was reduced to 12-1/2 gpa, the concentration of 2,4-D was increased by a factor of 4 to obtain the same 2 lb/A rate. This higher concentration resulted in a significant increase in injury.

In summary, the safest method of applying 2,4-D was with the larger orifice resulting in a larger spray droplet that did not drift as far.

The effect of 3 herbicides, time and nozzle size on drift as shown by young tomato plants. (425-73-502-3-78)

Herbicide	lb/A	Orifice Size	GPA	Time Exposed	Ave. Phyto 1/ Distance From Nozzle 10	30	50	80 ft.
Glyphosate	2	8004 E	50	10 sec	10.0	7.3	3.0	1.7
2,4-D OSA	2	8004 E	50	10 sec	8.3	6.7	4.0	0.0
2,4-D OSA	2	8001 E	50	40 sec	8.0	7.3	4.3	1.0
2,4-D OSA	2	8001 E	12-1/2	10 sec	8.3	8.0	7.0	4.7
Paraquat	2	8004 E	50	10 sec	10.0	9.3	2.7	0.3
Check	-	—	—	—	0.0	0.0	0.0	0.0

1/ Average of 3 replications where 0 = no effect, 3 = easily seen symptoms, 7 = injury sufficient to make recovery doubtful, 10 = complete kill.
Treated 8/28/78. Evaluated 9/10/78.

The effect of herbicide drift from newly treated soil.

To some extent, all herbicides can volatalize off newly treated soil and may cause symptoms if the drift onto adjacent crop foliage. The extent to which herbicides might drift in this fashion was the purpose of an experiment conducted on 9/23/78. Three flats of a Delhi loamy sand (72% sand, 22% silt, 6% clay and 0.13% organic matter) were treated with oxyfluorfen (Goal), glyphosate (Roundup) and 2,4-D (Emulsamine), then placed separately in a wind tunnel made with 20" diameter cement pipes. Indicator plants were placed in the tunnel at 10', 20' and 30' from the flats of soil with a fan blowing at 10 MPH over the treated soil down the tunnel. A second run was conducted with oxyfluorfen 5-10 minutes after the soil was treated to see if there was any reduction in volatility after a few minutes had lapsed.

The evaluation made 10/5/78 showed there was considerably more volatility and drift injury to the test plants with oxyfluorfen than with glyphosate or 2,4-D. By allowing oxyfluorfen to remain on the soil surface 5-10 minutes

prior to placing it in the wind tunnel, the volatility was reduced, thus resulting in less drift injury to the tomatoes and melons.

This experiment points out that drift can result even after the actual spraying is completed. More volatile herbicides, such as oxyfluorfen, as was shown in this test, can still cause symptoms for a short time after application. More tests will be conducted on a number of herbicides to determine how much injury might be expected as a result of drift by the volatilized herbicides.

Comparison of herbicide drifts from 10 MPH wind on newly treated soil. (425-73-502-4-78)

		Phytotoxicity[1]					
		Tomatoes			Melons		
Herbicide	lb/A	10'	20'	30'	10'	20'	30'
Oxyfluorfen	4	5.7	5.7	5.7	4.3	4.7	3.3
Oxyfluorfen[2]	4	3.0	2.3	1.7	3.0	2.0	1.7
Glyphosate	4	2.0	2.5	3.0	0.3	1.3	3.0
2,4-D	4	0.0	0.7	0.0	1.3	2.0	1.5
Check	-		0.3			0.3	

[1] Average of 3 replications where 0 = no effect, 10 = complete kill. Treated 9/23/78. Evaluated 10/5/78.
[2] Delayed oxyfluorfen treatment. Soil placed in wind tunnel 5-10 minutes after treatments.

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 almonds.

By including this written report with the previous work published and the future work yet to be done, we expect eventually to develp recommendations for weed control in almonds. 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

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

> Used: at the wrong stage of palnt development; in certain soil types; when temperatures are too high or too low; the wrong formulation is used; and excessive rates or incompatible materials are used.

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.

ACKNOWLEDGMENTS:

The authors wish to thank the Almond Board for their continuing financial support. Also, thanks to the following chemical companies that have contributed significantly to our current weed control program in almonds: Eli Lilly, Stauffer, Rohm & Haas, Sandoz, Ciba-Geigy, U.S. Borax and 3M Company.

We also wish to acknowledge the support of all those companies supplying herbicides for testing, including: Amchem Products, Monsanto, Rhone-Poulenc, Inc., Dow and Chevron.

Acknowledgments also go to Bob Mullin, D. Holmberg, Ron Schneider, L. Nygren, Clyde Elmore and Bill Fischer for their excellent cooperation.

Thanks to Jean Rotan for typing, composition, etc.

The University of California Cooperative Extension in compliance with the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and the Rehabilitation Act of 1973 does not discriminate on the basis of race, creed, religion, color, national origin, sex, or mental or physical handicap in any of its programs or activities. Inquiries regarding this policy may be directed to: Warren E. Schoonover, 317 University Hall, University of California, Berkeley, California 94720, (415) 642-0903.

San Joaquin Valley
Agricultural Research & Extension Center
9240 South Riverbend Avenue
Parlier, California 93648