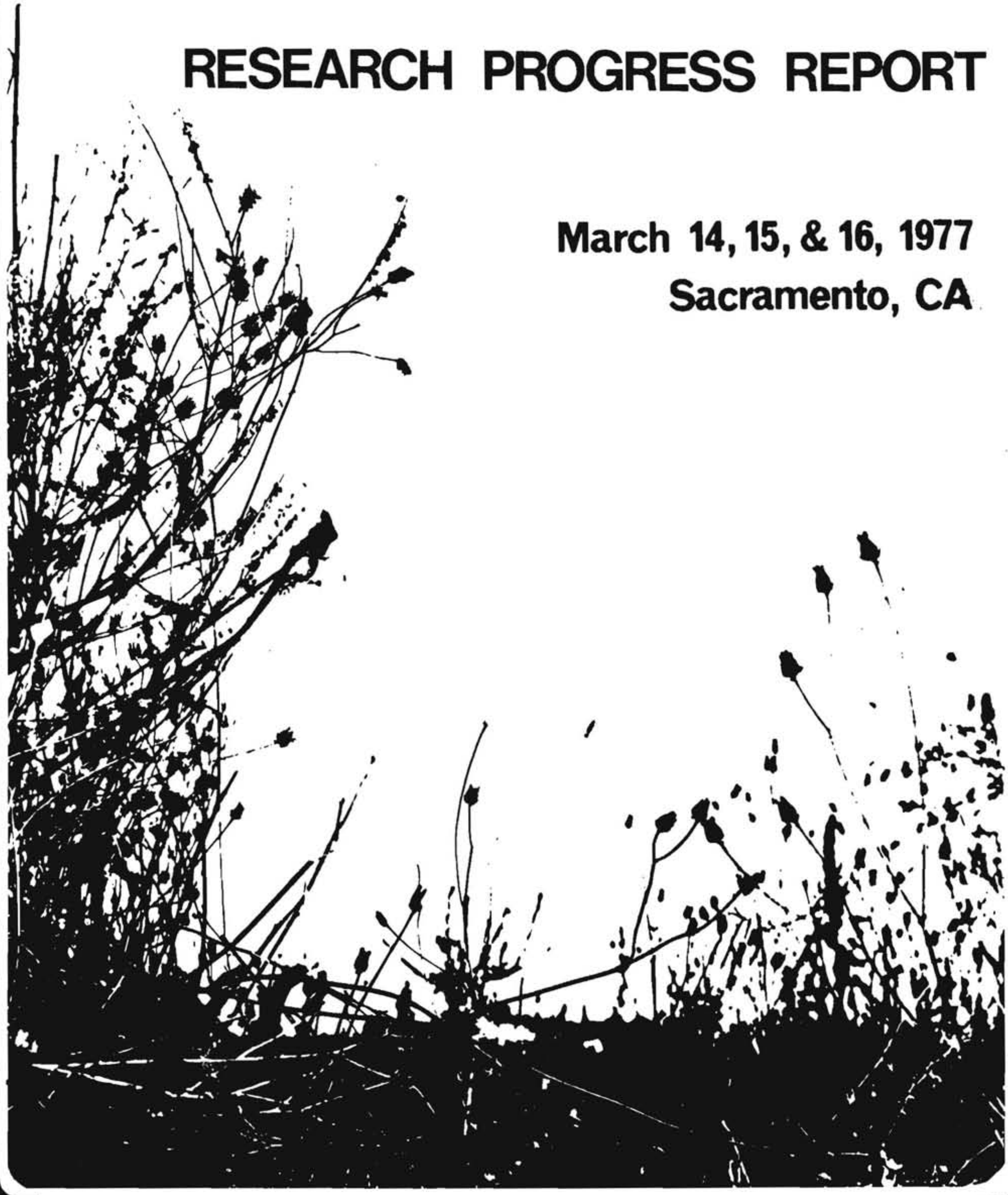
Western Society of Weed Science

RESEARCH PROGRESS REPORT



March 14, 15, & 16, 1977
Sacramento, CA

Research Progress Report

Western Society of Weed Science

Sacramento, California

March 15, 16, 17, 1977

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FOREWARD

The 1977 annual Research Progress Report of the Western Society of Weed Science consists of 126 reports of recent investigations in weed science. This is the highest number of papers ever submitted. All reports were voluntarily submitted by research and extension weed scientists. The report will be complimented by the proceedings from the annual meeting held in March, 1977 in Sacramento, California. The research committee consists of a chairman and seven project chairmen who assemble and summarize the information in their respective areas. All reports have been edited for conformity to chemical and weed nomenclature and for correction of obvious errors. Final editing was done by the chairman of the research committee and any questions or comments should be directed to him. Information contained in the Research Progress Report should be considered tentative and <u>NOT FOR PUBLICATION</u>. Abstracts should not be reproduced without permission of the authors. Reports printed in the Progress Report do not constitute prior publication.

This report does not contain recommendations for herbicide use, nor does it imply that uses discussed in the text are registered by the Environmental Protection Agency. Registered trade names have been used occasionally for informative purpose only and their use does not imply endorsement by the Society or the author.

The common and botanical names of weeds suggested by the subcommittee on standardization of names of weeds of the Weed Science Society of America have been used (see Weed Science 19:473-476, 1971). The common names of herbicides have followed the report of the terminology committee of the Weed Science Society of America, where possible, and are consistent with the common names reported in Weed Science 24(5), 1976 and the WSSA Herbicide Handbook, 3rd edition. When known, the full chemical name of numbered compounds has been given.

The research committee extends its gratitude to those who have contributed reports. The Chairman extends his thanks to each research project chairman for his work and for meeting the deadlines imposed upon him.

Larry C. Burrill
Chairman of the Research Committee
Western Society of Weed Science
1977

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PROJECT 1

PERENNIAL HERBACEOUS WEEDS

E.S. Heathman, Project Chairman

SUMMARY -

Twelve papers were submitted. These papers included control of bermudagrass (two types), Canada thistle, johnsongrass, leafy spurge, purple nutsedge, and Russian knapweed.

Bermudagrass - Glyphosate at 2 lb/A applied every 8 weeks during the growing season to two types of bermudagrass for two years controlled 70% of the plants and reduced the size of those remaining plants by 99.5%. Cacodylic acid at 4 lb/A applied every 2 weeks for 2 years controlled some of the bermudagrass and also reduced the size of the remaining plants by 99.5%. In a similar test, glyphosate applied at 2 or 3 month intervals was most effective at 2 or 3 lb/A. There was little difference in 2 or 3 month intervals between treatments. Giant and common bermudagrass gave about equal response to the herbicides.

Canada thistle - In one study picloram + 2,4-D, Dowco-290, and dicamba were the only treatments showing control 2 years following application. In another study, Dowco-290 at 0.4 lb/A controlled Canada thistle and showed good selectivity to associated grass species.

Johnsongrass - A combination of low rates of glyphosate (1 or 2 lb/A) plus a standard rate of MSMA (4 lb/A) gave good control of johnsongrass one year following treatment.

Leafy spurge - Picloram at 1 and 2 lb/A were the only treatments resulting in 90% or better control. High rates of dicamba and 2,4-D as well as glyphosate at 2 or 3 lb/A reduced stands of leafy spurge.

Purple nutsedge - Repeated applications of glyphosate the preceding year delayed emergence of purple nutsedge the following year. Higher rates (4 to 6 lb/A) controlled some plants and reduced growth of others. By the end of the second season of applications, control was no better than at the end of the first year. In another study, glyphosate at 6 or 9 lb/A gave 95% control when applied at two or three month intervals. EL 171 applied to the soil gave excellent control in another test. Two foliar applications of glyphosate at 8 lb/A gave only 50% control. In a fumigation study, methyl bromide plus chloropicrin applied in 10 inch bands, gave consistent control of purple nutsedge in the seed row.

Russian knapweed - Applications of Dowco 290 and picloram + 2,4-D resulted in excellent control one and two years following treatment. They showed good selectivity toward grass. Glyphosate gave 95% control of Russian knapweed but annual weeds were competitive the second

year. In a similar test, one year after application, Dowco 290 gave 100% control with no grass injury. Picloram + 2,4-D also controlled Russian knapweed but damaged the grass.

PAPERS -

Response of two bermudagrass types to applications of glyphosate for two years. Hamilton, K.C. The response of two types of bermudagrass to repeated foliar applications of glyphosate for two years was determined at Tucson, Arizona in 1975 and 1976. Giant and common bermudagrass plants spaced 9 by 15 feet were established by planting rhizome segments from a single parent plant for each type in the spring of 1974. During the first year, seed heads were removed by mowing. Each year, low rates of trifluralin and simazine were applied to the soil to control annual weeds. Irrigation was similar to that given cotton. Starting April 29, 1975, and May 3, 1976, 1, 2, and 3 lb/A of glyphosate in 25 gpa were applied at 2 and 3-month intervals until October. The same treatments were applied to the same plots each year. Each plot contained four plants and treatments were replicated four times. The area covered by living topgrowth was estimated for each plant before each treatment.

At the end of the first year only the 3 lb/A rate of glyphosate had reduced the number of plants with topgrowth (table). The best control in a single season was with 2 or 3 lb/A of glyphosate applied at 2 or 3-month intervals. Many of the plants with topgrowth at the end of the first season had no topgrowth in May of the second year. This occurred with plants treated with the 2 and 3 lb/A rates. Some plants produced their first growth in June and July of the second year. There was little difference in the response of giant and common bermudagrass. Applications of 1 lb/A for two seasons did not kill either type of bermudagrass. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Bermudagrass plants with topgrowth after applications of glyphosate for two years at Tucson, Arizona

Treatments			Plants with topgrowth		
Type	Months between	lb/A	10/13/75	5/3/76	10/18/76
Giant	2	1	16	15	14
Giant	2	2	16	0	0
Giant	2	3	12	0	0
Giant	3	1	16	16	16
Giant	3	2	16	0	2
Giant	3	3	13	0	0
Common	2	1	16	16	14
Common	2	2	16	2	2
Common	2	3	9	0	0
Common	3	1	16	16	14
Common	3	2	16	0	6
Common	3	3	15	0	2

Response of two bermudagrass types to applications of three herbicides for two years. Hamilton, K.C. The response of giant and common bermudagrass to repeated, foliar applications of three herbicides for two years was studied at Tucson, Arizona in 1975 and 1976. Plants were established 9 by 15 feet apart by planting rhizome segments from a single plant of each type in the spring of 1974. During the first year, seed heads were removed by mowing. Each year, low rates of trifluralin and simazine were applied to the soil to control annual weeds. Irrigation was similar to that used for cotton. The field was not cultivated during this test.

Starting April 29, 1975, and May 3, 1976, (a) 2 lb/A of glyphosate and (b) 20 lb/A of dalapon in 25 gpa were each applied every eight weeks. Cacodylic acid at 4 lb/A (the first six applications in 1975 were with 2 lb/A) was applied in 80 gpa of water every two weeks. The same treatments were applied to the same plots each year. Each plot contained four plants and treatments were replicated four times. The area covered by living topgrowth was estimated for each plant before each treatment.

At the end of the first year, no treatment had reduced the number of plants with topgrowth (table) but glyphosate had reduced the area dovered by topgrowth more than dalapon or cacodylic acid. In the spring of the second year, many plants treated with glyphosate did not have regrowth or regrowth was delayed until June or July. At the end of the second season, 70% of plants treated with glyphosate had no regrowth. Both glyphosate and cacodylic acid had reduced the size of surviving plants by 99.5%. There was little difference in the response of giant and common bermudagrass to herbicides after two years of treatment. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Bermudagrass plants with topgrowth after applications of three herbicides for two years at Tucson, Arizona

Treatments			Plants with topgrowth		
Type	Herbicide	lb/A	10/13/75	5/3/76	10/18/76
Giant	glyphosate	2	16	2	3
Giant	dalapon	20	16	16	16
Giant	cacodylic acid	4	16	16	16
Common	glyphosate	2	16	10	7
Common	dalapon	20	14	16	16
Common	cacodylic acid	4	16	16	10

Canada thistle control one and two years following treatment. Alley, H.P. An area which had been cultivated during the 1974 growing season was selected for the Canada thistle control study. Canada thistle had recovered from previous cultivations and was in the early bud-stage of growth at time of treatment. The herbicides were applied 7/10/74 with a three-nozzle knapsack spray unit in a total volume of 40 gpa water. Plots were one sq rd in size with three replications. The soil at the location was classified as sandy loam - 76.8% sand, 12.4% clay, 10.8% silt, 2.18% organic matter and 7.6 pH.

Weed control evaluations were made 7/1/75 and 6/29/76 approximately one and two years following treatment.

Picloram + 2,4-D, Dowco-290 and the heavy rate of dicamba were the only treatments that resulted in a reduction in Canada thistle two years following application. All other treated plots were reinfested to their original stand. (Wyoming Agric. Exp. Sta., Laramie, SR-767).

Herbicides, Canada thistle control one and two years following treatment

Herbicide 1/	Rate lb/A ai	Percent Control 1975	1976	Observations
dicamba+2,4-D	1+3	80	0	complete reinfestation
dicamba+2,4-D	1.5+4.5	80	0	complete reinfestation
dicamba	2	50	0	complete reinfestation
dicamba	4	95	75	fair control for two yrs
VEL-4207	2	70	0	complete reinfestation
VEL-4207	4	80	0	complete reinfestation
VEL-4359	2	0	0	
VEL-4359	4	60	0	complete reinfestation
picloram+2,4-D	0.5+1	100	90	some recovery
picloram+2,4-D	1+2	100	100	annual mustards
triclopyr	0.75	40	0	complete recovery
triclopyr	1.5	85	0	complete recovery
triclopyr	3	85	0	complete recovery
Dowco 290	0.75	100	95	kochia & mustard in plots
Dowco 290	1.5	100	100	kochia & mustard in plots
Dowco 290	3	100	100	kochia & mustard in plots
Dowco 290+2,4-D	0.125+0.5	90	75	kochia & mustard in plots
Dowco 290+2,4-D	0.25+1	90	75	kochia & mustard in plots
Dowco 290+2,4-D	0.5+2	95	85	kochia & mustard in plots
GK-40	2 gal.	70	0	complete reinfestation
glyphosate	3	70	0	complete reinfestation
glyphosate	4	80	0	complete reinfestation

1/ Treated 7/10/74; evaluated 7/1/75 & 6/29/76.

Canada thistle control. Alley, H.P. The Canada thistle control evaluation plots were established on land which was originally a flood-irrigated meadow which had been plowed two years earlier. The Canada thistle was in the early bud-stage of growth at time of treatment. Herbicides were applied with a three-nozzle knapsack sprayer in a total volume of 40 gpa water carrier. Plots were on sq rd, randomized with three replications. The soil was classified as a sandy loam - 66.8% sand, 21.2% silt, 12.0% clay, with 0.97% organic matter and a 8.1 pH.

Visual weed control evaluations were made 6/25/76 approximately eleven months following treatment.

Percentage Canada thistle control increased as the rate of dicamba was increased, however a difference of only 5% control between the 4 lb/A and 8 lb/A treatment would not warrant the increased cost. VEL-4207 at the 8 lb/A rate gave 95% control of the Canada thistle but killed the associated grass species. Metribuzin showed early and rapid foliage burndown but did not give adequate control to be considered as a compound for Canada thistle control. Dowco 290 was a very effective compound even at the low rate of 0.375 lb/A. Higher rates of application resulted in considerable grass damage. Chlorflurenol and bentazon were not effective at the rates applied. (Wyoming Agric. Exp., Laramie, SR-766).

Herbicides, Canada thistle control and visual observations

Herbicide 1/	Rate lb/A	Percent Control 2/	
dicamba	1	50	
dicamba	2	75	
dicamba	4	85	grass damaged
dicamba	8	90	grass damaged
FMC-25213	6	30	grass damaged
VEL-4207	1	45	
VEL-4207	2	50	killed grass
VEL-4207	4	65	killed grass
VEL-4207	8	95	killed grass
chlorflurenol	0.66	0	
metribuzin	2	10	
metribuzin	4	40	
triclopyr	0.375	10	
triclopyr	0.75	35	
triclopyr	1.5	45	
triclopyr	2.25	75	
triclopyr	3	90	
triclopyr + 2,4-DA	0.375+1	60	
triclopyr + 2,4-DA	0.75+1	30	
triclopyr + 2,4-DA	1.5+1	70	
triclopyr + 2,4-DA	2.25+1	70	
triclopyr + 2,4-DA	3+1	70	
Dowco 290	0.375	90	no damage to grass
Dowco 290	0.75	95	grass damaged
Dowco 290	1.87	100	took out most grass
Dowco 290 + 2,4-DA	0.375+1	95	took out most grass
Dowco 290 + 2,4-DA	0.75+1	100	took out most grass
Dowco 290 + 2,4-DA	1.87+1	100	took out most grass
bentazon	3	40	no grass damage
bentazon	4	30	no grass damage

1/ Treated 7/8/75; evaluated 6/25/76.

2/ Average of two replications.

The effect of combinations on the control of johnsongrass in an old vineyard. Lange, A. and J. Schlesselman. A heavy stand of johnsongrass in an old Thompson vineyard was sprayed with several combinations of herbicides in 100 gpa of water on 5/30/75. Johnsongrass control ratings were made 6/16/75, 7/7/76, 9/5/75 and 5/10/76. All treatments gave commercial johnsongrass control through the summer until the September evaluation at which time glyphosate plus chlorflurenol appeared best. Sometime after September the grower sprayed through all plots with dalapon at what is believed to be a commercial rate. The following spring good control was obtained in all plots except the check which received only the growers fall treatment. The combination of low rates of glyphosate plus a standard rate of MSMA appeared best. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 92648).

Johnsongrass control with herbicide combinations

		Average weed control ratings 1/			
Herbicides	lb/A	6/16/75	7/7/75	9/5/75	5/10/76
glyphosate	4	9.5	9.3	4.2	9.5
MSMA	8	8.2	7.8	3.5	8.2
glyphosate + MSMA	1+4	9.5	8.8	5.8	9.5
glyphosate + MSMA	2+4	9.2	8.5	4.8	9.2
glyphosate + chlorflurenol	1+2	7.5	8.0	6.8	7.5
glyphosate + chlorflurenol	1+4	8.2	8.3	6.8	8.2
glyphosate + mefluidide	1+4	7.8	7.0	4.8	7.8
glyphosate + mefluidide	1+8	7.8	7.3	5.0	7.8
Check	-	0.0	0.0	2.0	0.0

1/ Average of 4 replications. Based on 0 to 10 scale where 0 = no effect and 10 = apparent complete control. Treated 5/30/75.

Leafy spurge control. Alley, H.P. Plots were established 6/25/75 on a dryland range site heavily infested with leafy spurge. Treatments were applied with a three nozzle knapsack spray unit in 40 gpa water as carrier. Plots were 9 ft by 60 ft in size. The leafy spurge was in full bloom, 4 to 4-1/2 ft tall at time of treatment. The soil at the experimental site was classified as a loam - 41.6% sand, 34.4% silt, 24.0% clay with 3.75% organic matter and a pH of 7.5.

Picloram and picloram + 2,4-D at 1 and 2 lb/A picolinic acid equivalent were the only treatments resulting in 90% or greater reduction of leafy spurge stand. Dicamba at 8 lb/A, 2,4-D amine at 20 lb/A and glyphosate at 2 and 3 lb/A ai were the only other treatments affording effective control. Some of the treatments such as triclopyr and VEL-4207 gave early foliage knockdown but were ineffective in reducing leafy spurge stand. (Wyoming Agric. Exp. Sta., Laramie, SR 770).

Herbicides, leafy spurge control, and visual evaluations

Herbicide 1/	Rate lb/A	Percent Control	
triclopyr	1.5	0	no reduction in stand
triclopyr	3	0	good early-recovery later
triclopyr + 2,4-DA	1.5+1	0	good early-recovery later
triclopyr + 2,4-DA	3+1	0	poor activity both dates
Dowco 290	1	0	poor activity both dates
Dowco 290	2	0	poor activity both dates
Dowco 290 + 2,4-DA	1+1	0	poor activity both dates
Dowco 290 + 2,4-DA	2+1	0	poor activity both dates
picloram	1	98	few small spurge plants
picloram	2	98	smooth brome prostrate
picloram + 2,4-D	1+2	96	few small spurge plants
picloram + 2,4-D	2+4	98	smooth brome prostrate
picloram + dicamba	0.25+2	80	spurge healthy
picloram + dicamba	0.5+2	88	new regrowth
dicamba	2	20	
dicamba	4	50	no damage to grass
dicamba	8	80	no damage to grass
VEL-4207	4	50	good early-recovery later
VEL-4207	8	60	good early-recovery later
dicamba + 2,4-D	1+3	70	very good early-recovery later
2,4-DA	6	40	healthy spurge plants
2,4-DA	20	80	healthy spurge plants
glyphosate	2	80	good early-no residual
glyphosate	3	85	good early-no residual
glyphosate + 2,4-DA	1+2	50	good knockdown-no residual

1/ Treated 6/25/75; evaluated 8/18/75 & 6/15/76.

Response of purple nutsedge to applications of glyphosate for two years. Hamilton, K.C. Response of purple nutsedge to foliage applications of glyphosate was studied at Tucson, Arizona in 1975 and 1976. Ninety-six plants spaced 10 by 15 feet were established from the same parent in 1973. During the first two years, seed heads were removed by mowing. Each year, low rates of trifluralin and diuron or simazine were applied to the soil to control annual weeds. Irrigation was similar to that given cotton. Plants averaged 210 stems when treatments started in 1975. Starting May 27, 1975, and April 22, 1976, 2, 4, or 6 lb/A of glyphosate in 25 gpa of water were applied at 2 and 3-month intervals until fall. The same plots received the same treatment each year. Most plots contained four plants and each treatment was replicated four times. The number of stems per plant was estimated before each treatment.

The first year's treatments with glyphosate had reduced the number of plants with topgrowth and the number of stems per plant (table). Control of purple nutsedge increased as the rate of glyphosate increased. There was no difference between the 2 and 3-month intervals. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

There was no difference between the two and three-month intervals. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Purple nutsedge plants with topgrowth and number of stems per plant after applications of glyphosate for two years

Treatment		Plants with topgrowth		Stems per growing plant	
Months between	glyphosate lb/A	11/10/75	10/6/76	11/10/75	10/6/76
2	2	11	12	8	40
2	4	8	9	7	6
2	6	3	1	5	3
3	2	10	8	11	28
3	4	7	7	5	18
3	6	2	1	7	50

Response of purple nutsedge to rates of glyphosate. Hamilton, K.C. Response of purple nutsedge to foliage applications of three rates of glyphosate was studied at Tucson, Arizona in 1976. Ninety-six plants spaced 10 by 15 feet were established from the same parent in 1975. During the first year, seed heads were removed by mowing. Each year, low rates of trifluralin and simazine were applied to the soil to control annual weeds. Irrigation was similar to that given to cotton. Plants averaged 200 stems when treatments started in 1976. Starting April 22, 1976, 3, 6, or 9 lb/A of glyphosate in 25 gpa of water was applied at two and three-month intervals. Plots contained four plants and each treatment was replicated four times. The number of live stems per plant was estimated before each treatment.

The response of purple nutsedge to all rates of glyphosate was slow. A single application of 6 or 9 lb/A of glyphosate reduced the number of plants with topgrowth and reduced the number of stems per plant by 95% (table). There was little difference in control between the two and three-month treatments intervals. No treatment appeared to kill all plants at the end of the first season. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Purple nutsedge plants with topgrowth and number of stems per plant treated with three rates of glyphosate at Tucson, Arizona in 1976

Treatment		Date of treatment			
Months between	lb/A glyphosate	4/22	7/12	8/9	10/6
		Plants with topgrowth			
2	3	16	15	14	14
2	6	16	7	2	6
2	9	16	5	3	4
3	3	16	15	14	12
3	6	16	8	8	4
3	9	16	8	9	1
		Stems per growing plant			
2	3	200	58	18	13
2	6	210	6	2	2
2	9	180	5	2	5
3	3	230	55	64	16
3	6	180	13	24	4
3	9	190	7	11	5

Fumigation weed control: problems and results. Lange, A. and R. Goertzen. Several fumigants are being evaluated for their efficacy in controlling yellow and purple nutsedge and several species of nightshade. The application method used was to deeply inject the fumigant down the seed line and then to seal in the gas in high, 12 to 18 inches, peaked beds. After sufficient time has elapsed for a lethal dose to accumulate or after the gas has dissipated, the clean fumigated "heart" of the peaked bed is exposed by knocking off the top with a bed shaper and then planting the desired crop. Best results have been obtained when the point of fumigation injection was about three inches below the predetermined height of the seed line.

Two forms of methyl bromide were evaluated on a Delhi sandy loam in eastern Fresno County infested with purple nutsedge. One form contains a slow-release gel which has 66% methyl bromide and 32% chloropicrin. The second contains a slow release diluent solvent which carries 70% methyl bromide and 1% chloropicrin.

Results with methyl bromide (70%) and chloropicrin (1%) were erratic, with some effect seen at 100 lbs/A. The high rate of methyl bromide (67%) and chloropicrin (32%), 80 lbs. methyl bromide per field acre, gave consistent control of nutsedge in a 10 inch band. The low rates of 40 lbs/A showed moderate stand and vigor reduction of the nutsedge. Counts were taken from a 10 by 60 inches band with the injection line on the center of the 10 inches. The point of injection was dry, whereas the soil thrown to make the peaked beds was at field capacity. (University of California, Cooperative Extension, Parlier, CA 93648).

A comparison of two forms of methyl bromide deeply injected into large beds, later knocked off and their effect on purple nutsedge on a Delhi loamy sand

Fumigant[3/]		lbs/acre[2/]	Average Number Row 1	Nutsedge[1/] Row 2
CH_3Br	Gas	50	54.5	27.3
CH_3Br	Gas	100	57.5	23.5
CH_3Br	Gel	40	17.0	23.5
CH_3Br	Gel	80	4.5	1.0
Check		-	88.6	23.0

1/ Four samples (each 5 sq ft) taken from each of two replications per row. Treated 6/8/76. Beds shaped 6/17/76. Evaluated 7/8/76.

2/ Single shank injection; rates given are for field acre, multiply rate given by five to get concentration dose in 1 ft treated area on 5 ft beds. Rates are for actual weight of methyl bromide applied.

3/ Terr-O-Gas: 70% CH_3Br, 1% chloropicrin, 29% solvent.

Terr-O-Gel: 66% CH_3Br, 32% chloropicrin, 2% gel agent.

The control of purple nutsedge in young peach trees. Lange, A., J. Schlesselman and L. Nygren. Young peach trees in their first leaf heavily infested with purple nutsedge were treated with seven herbicides postplant on 6/18/76. These herbicides were incorporated down the tree row with a power tiller to a depth of about three inches in dry soil. Irrigation was by furrow on 6/25/76. Three treatments were applied to the foliage of the nutsedge. They were glyphosate at 4 and 8 lbs/A in 50 gal/A and paraquat at 1 lb/A. These postemergence treatments were reapplied on 7/26/76.

Glyphosate at 8 lbs/A gave only partial control of purple nutsedge as regrowth appeared rapidly after initial knockdown.

Of the preplant incorporated herbicides, EL-171 was most outstanding with norflurazon providing substantial control. FMC-25213 and HER-26910 showed some slight control of nutsedge. R-37878 was ineffective on purple nutsedge. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 92648).

A comparison of herbicides for control of purple nutsedge (425-73-502-118-2-76)

Herbicides	lb/A	Average ratings[1/] Nutsedge Control 7/11/76	9/15/76	Phytotoxicity 9/15/76
glyphosate[2/]	4	4.7	5.0	0.0
glyphosate[2/]	8	8.7	5.3	0.0
norflurazon	2	5.3	6.0	0.0
norflurazon	4	6.0	7.7	0.0
EL-171	1	5.0	8.3	0.0
EL-171	2	7.1	9.0	0.0
FMC-25213	4	6.7	4.7	0.0
FMC-25213	8	6.3		0.0
R-37878	4	5.3	3.0	0.0
R-37878	8	5.0	1.7	0.0
HER-26910	2	4.3	4.7	0.0
HER-26910	4	5.7	5.7	0.0
Check (Tilled)	-	1.7	4.0	0.0
paraquat [2/]		1.7	3.0	0.0

1/ Average of 3 replications. Based on 0 to 10 scale where 0=no effect and 10=complete control or all plants dead. Treated 6/18/76.
2/ Not tilled after herbicide application.

Russian knapweed control one and two years following treatment. Alley, H.P. A pasture which had been invaded by a heavy stand of Russian knapweed was selected for the control evaluation site. Russian knapweed was in the late bud-stage of growth at time of treatment. The herbicides were applied 7/9/74 in a total volume of 40 gpa water with a three-nozzle knapsack spray unit. Plots were 1 sq rd in size with each treatment replicated three times. The soil was classified as a sandy loam - 72.8% sand, 19.6% silt, 7.6% clay, with 2.53% organic matter and a pH of 7.9.

Weed control evaluations were made 7/1/75 and 6/25/76 approximately one and two years following treatment. Picloram + 2,4-D at 0.5 + 1 and 1 + 2 lb/A, Dowco 290 at 0.75, 1.5 and 3 lb/A and Dowco 290 + 2,4-D at 0.125 + 0.5, 0.25 + 1 and 0.5 + 2 lb/A were the only treatments maintaining the same level of control over the two year period. These were also the same treatments which resulted in 100% control for both years. Glyphosate had only a 5% reinfestation after two years. (Wyoming Agric. Exp. Sta., Laramie, SR-769).

Russian knapweed control one and two years following treatment

Herbicide 1/	Rate lb/A	Percent control 1975	1976	Observations
dicamba + 2,4-D	1 + 3	70	0	reinfested
Dicamba + 2,4-D	1.5 + 4.5	100	0	reinfested
dicamba	2	100	50	reinfested
dicamba	4	100	60	reinfested
VEL-2407	2	95	80	knapweed seedlings
VEL-4207	4	100	80	knapweed seedlings
BEL-4359	2	98	20	reinfested
VEL-4359	4	100	40	reinfested
picloram + 2,4-D	0.5 + 1	100	100	good grass
picloram + 2,4-D	1 + 2	100	100	good grass
triclopyr	0.75	95	50	knapweed seedlings
triclopyr	1.5	95	50	knapweed seedlings
triclopyr	3	95	50	knapweed seedlings
Dowco 290	0.75	100	100	clean, good grass
Dowco 290	1.5	100	100	clean, good grass
Dowco 290	3	100	100	clean, good grass
Dowco 290 + 2,4-D	0.125 + 0.5	100	100	few mustard and kochia
Dowco 290 + 2,4-D	0.25 + 1	100	100	clean, good grass
Dowco 290 + 2,4-D	0.5 + 1	100	100	clean, good grass
GK-40	2 gal	95	10	reinfestation
glyphosate	3	100	95	mustard, kochia and
glyphosate	4	100	95	sweetclover in plots

1/ Treated 7/9/74; evaluated 7/1/75 and 6/25/76.

Russian knapweed control. Alley, H.P. The experimental site was an undisturbed rangeland, heavily infested with Russian knapweed which was in the pre-bud, 12 to 18 inch growth stage at time of treatment.

All herbicides were applied with a three-nozzle knapsack spray unit in 40 gpa water carrier.

Visual evaluations made approximately one year following treatment showed that picloram at 1 and 2 lb/A, picloram + 2,4-D at 1 + 2 and 2 + 3 lb/A and Dowco 290 at 1 + 2 lb/A gave 100% control of the Russian knapweed. Triclopyr gave no control at the rates applied.

Dowco 290 did not cause any apparent damage to the associated grass species; whereas picloram caused prostrate growth and some height inhibition. (Wyoming Agric. Exp. Sta., Laramie, SR-768).

Russian knapweed control and visual observations

Herbicde 1/	Rate lb/A	Percent control	
picloram	1	100	no damage to grass
picloram	2	100	grass damage
picloram + 2,4-D	1 + 2	100	killed sagebrush
picloram + 2,4-D	2 + 3	100	killed sagebrush
triclopyr	1.5	0	
triclopyr	2.25	0	
2,4-D amine	20	30	
dicamba + 2,4-D	2 + 6	50	no grass damage
Dowco 290	1	100	no grass damage
Dowco 290	2	100	no grass damage
triclopyr + 2,4-D	1.5 + 1	0	
triclopyr + 2,4-D	3 + 1	0	

1/ Treated 6/12/75; evaluated 6/22/76.

PROJECT 2

HERBACEOUS WEEDS OF RANGE AND FOREST

Howard Morton, Project Chairman

SUMMARY -

The phytophagous insect Rhinocyllus conicus was released in the Gallatin Valley of Montana from 1969 to 1973 for control of musk thistle, and the number of seeds produced by parasitized plants has been drastically reduced. Spraying musk thistle July 1 and later with 2,4-D did not affect the number of emerging adult weevil; however, clipping reduced emergence of adult weevils.

Spraying with hexaflurate at 1.5 or 3.0 lb/A in Arizona resulted in 99 to 100% control of Opuntia species after five years.

A mixture of dalapon and atrazine at 8 + 4 lb/A gave good control of grasses in ponderosa pine and Douglas fir plantings east of the Cascade Range in Oregon and Washington. This mixture also controlled forbs in Oregon but no herbicide gave consistent control of forbs in Washington. Dalapon either alone or in mixture with atrazine caused damage to Douglas fir foliage but did not reduce seedling survival. Velpar at 2 lb/A gave excellent control of grasses and forbs in Oregon and good control in Washington.

PAPERS -

Controlling grasses to aid establishment of conifer plantations in dry forest habitats. Dimock, Edward J. II. Availability of soil moisture can become critical in summer months to conifers newly planted in grassy habitats east of the Cascade Range. Previous study has shown that a mixture of dalapon and atrazine applied shortly after planting will effectively control competing grasses and forbs with little phytotoxicity to conifers. Further evaluation of this combined formulation as well as screening of newer candidate herbicides are needed. Trials aimed at both objectives were initiated in the spring of 1976 with a combination of two experiments at each of two locations: 1) The Chesnimnus District, Wallowa-Whitman National Forest, Oregon; and 2) the Entiat District, Wenatchee National Forest, Washington.

Vegetation control and survival of both ponderosa pine and Douglas-fir were tested in response to the following 21 treatments:

Experiment A (postplanting sprays)

1 - untreated (control)
2 - seedlings covered, 8 lb ai dalapon/A
3 - seedlings covered, 4 lb ai atrazine/A

4 - seedlings covered, 8 lb ai dalapon + 4 lb ai dalapon + 4 lb ai atrazine/A
5 - seedlings exposed, 8 lb ai dalapon/A
6 - seedlings exposed, 4 lb ai atrazine/A
7 - seedlings exposed, 8 lb ai dalapon + 4 lb ai atrazine/A

<u>Experiment B</u> (preplanting and postplanting sprays)

8 - untreated (control)
9 - preplant, 1 lb ai methazole/A
10 - preplant, 4 lb ai chloroxuron/A
11 - preplant, 2-2/3 lb ai cyanazine + 1-1/3 lb ai atrazine/A
12 - preplant, 3 lb ai napropamide/A
13 - preplant, 3 lb ai oxadiazon/A
14 - preplant, 2 lb ai Velpar/A
15 - postplant, 1 lb ai methazole/A
16 - postplant, 4 lb ai chloroxuron/A
17 - postplant, 2-2/3 lb ai cyanazine + 1-1/3 ai atrazine/A
18 - postplant, 1-1/2 lb ai glyphosate/A
19 - postplant, 3 lb ai napropamide/A
20 - postplant, 3 lb ai oxadiazon/A
21 - postplant, 2 lb ai Velpar/A

All herbicides were applied with backpack sprayers in water carriers at 200 gal/A to square 1/100 - A plots either two weeks before or two weeks after tree planting. Each plot contained 15 ponderosa pine and 15 Douglas-fir seedlings planted in late May (Chesnimnus) and early June (Entiat) and all plots were replicated in 3 blocks on each District. Control of grasses and forbs plus damage to conifers were assessed in July; seedling survival in October.

In Experiment A, mixed dalapon and atrazine clearly gave best grass control on both Districts and best forb control at Chesnimnus (Table 1). No herbicide gave consistently superior forb control at Entiat. No differences between seedlings covered or exposed at time of spraying were seen in July at any location; but some damage to Douglas-fir foliage exposed to dalapon, both alone and in mixture with atrazine, was seen in October at Entiat. Seedling survival for both ponderosa pine and Douglas-fir after one summer was excellent for all treatments at both locations.

In Experiment B, Velpar was clearly superior to other candidate herbicides (Table 2). In July, it gave excellent grass and forb control at Chesnimnus and good control at Entiat. By October, grass control with Velpar at Entiat had increased from 50 and 60 percent to 93 and 97 percent for preplanting and postplanting applications, respectively--the only instance of an herbicide showing visibly improved performance between July and summer's end. At rates applied, only cyanazine + atrazine and glyphosate gave grass and forb control comparable with the light to moderate levels attained with dalapon and atrazine used alone in Experiment A. Preplanting and postplanting applications of herbicides in Experiment B did not differ with any consistency in vegetation control, and no damage to conifer foliage was evident. Again, seedling survival for both conifer species was excellent for all treatments and locations.

A cool, moist summer in 1976 favored seedling survival and probably minimized any adverse effects on seedlings attributable to herbicide sprays. Treatment benefits in terms of differential tree survival should be more readily evident upon reassessment in 1977. (Pac. Northwest Forest and Range Exp. Stn., U.S. Forest Service, Corvallis, OR 97331).

	Vegetation control				Seedling survival			
	Grasses		Forbs		Ponderosa pine		Douglas-fir	
Herbicide	Ches	Entiat	Ches	Entiat	Ches	Entiat	Ches	Entiat
Untreated	0	0	0	0	91	82	87	87
Postplanting broad-cast sprays								
(covered)								
dalapon	43	57	10	27	96	82	67	96
atrazine	67	40	60	17	84	76	82	96
dalapon + atrazine	87	83	67	27	98	87	84	93
(exposed)								
dalapon	50	47	10	10	91	76	84	93
atrazine	57	23	37	33	93	73	89	91
dalapon + atrazine	87	70	70	30	84	71	80	91
Untreated	0	0	0	0	89	76	80	78
Preplanting broad-cast sprays								
methazole	3	7	0	0	82	76	91	98
chloroxuron	7	0	0	3	93	84	84	96
cyanazine + atrazine	60	10	10	17	87	69	80	91
napropamide	10	3	3	3	84	82	82	96
oxadiazon	3	33	3	3	97	71	84	84
Velpar	97	50	87	40	87	82	80	98
Postplanting broad-cast sprays								
methazole	17	3	17	7	84	67	82	93
chloroxuron	7	0	20	3	96	69	84	91
cyanazine + atrazine	60	50	53	27	89	82	84	91
glyphosate	43	43	13	13	76	78	78	96
napropamide	3	0	10	0	87	78	80	89
oxadiazon	23	10	23	3	91	71	89	96
Velpar	87	60	77	47	98	91	82	98

Biological control of musk thistle. Miller, T.J. and L.O. Baker. The population of Rhinocyllus conicus as a parasite of musk thistle has made a spectacular increase in the Gallatin Valley of Montana. From about 3,000 adults released during 1969 to 1973, the weevil dispersed throughout an infestation that covers an estimated 26,000 hectares within an area of about 2,500 sq km. Both spring and late summer collections have been made and distributed into most of the major musk thistle infestations in Montana. Reproduction has been observed at all locations.

R. conicus was found in 78 percent of the seed heads in three experimental sites in 1976. Virtually all of the first flowers contained larvae while those flowers produced late in the season had no insects. Inconclusive results indicate approximately 90 percent reduction in number of seeds produced. Adults first emerged from seed heads July 26.

A management study to reduce the economic impact of musk thistle without endangering the success of R. conicus was initiated with the use of 2,4-D and clipping treatments at various times during the year. A 2.2 kg/ha rate of 2,4-D applied July 1 and later, killed seedlings but not established plants. The spray appeared to have no adverse effect on the number of emerging adult weevil, nor did it stop seed production. Clipping July 1 and July 15 reduced insect survival to 0 and 11 percent respectively. A third clipping, August 1, also affected R. conicus with a survival of 59 percent while 92 percent of the weevil emerged from the unclipped plots. (Montana Agricultural Experiment Station, Bozeman, MT 59715).

Response of Opuntia to hexaflurate. Hamilton, K.C. A study to determine the effect of hexaflurate on pricklypear and related Opuntia was started near Tucson, Arizona in 1970. Hexaflurate at 1.5 and 3.0 lb/A was applied in 10 gpa of water in August, November, and March. Each treatment was applied to a single, 8000 sq ft plot. There were two species of pricklypear and one cylindrical Opuntia, Jumping cholla, covering 35% of the test area. Control of Opuntia was rated two to four times each year.

All treatments resulted in 99 to 100% control of Opuntia species (table). All three Opuntia species were susceptible to hexaflurate. Two to four years were required for control to reach 98 to 100%. The treated area was not fenced and cattle grazing on the treated plants hastened the destruction of pricklypear. Growth of pricklypear was reduced as much as 30 feet down the slope from treated plots by movement of herbicide with runoff water or debris. The growth of annual plants was decreased in 1971 and 1972. Despite the control of pricklypear, in most years there has been no or little increase in forage plants of five of the six treatments. From 1971 to 1976 no new Opuntia plants have become established on any treated plot. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Response of Opuntia to hexaflurate near Tucson, Arizona

Treatments		Percent control estimated					
Date	lb/A	1971	1972	1973	1974	1975	1976
Aug., 1970	0	0	0	0	0	0	0
Aug., 1970	1.5	50	80	90	98	00	99
Aug., 1970	3.0	80	98	99	100	100	100
Nov., 1970	0	0	0	0	0	0	0
Nov., 1970	1.5	40	80	98	99	99	100
Nov., 1970	3.0	80	85	99	99	99	100
March, 1971	0	0	0	0	0	0	0
March, 1971	1.5	30	50	98	99	98	99
March, 1971	3.0	40	80	98	99	99	100

PROJECT 3

UNDESIRABLE WOODY PLANTS

Thomas N. Johnsen, Jr., Project Chairman

SUMMARY -

Krenite was effective on deciduous shrubs but not evergreen ones in widely separated trials reported by Gratkowski, Stewart and Weatherly in Oregon and Johnsen in Arizona. Tebuthiuron broadcast onto the soil controlled Utah juniper, manzanita, shrub live oak and pinyon in Arizona tests. Smaller sized pellets seemed more effective than large tablets for Utah juniper control on clayey soils.

Gratkowski, Stewart and Weatherly also compared the results of Krenite, picloram, triclopyr, 2,4,5-T and 2,4-D tests two years after applications onto several Oregon shrub species. Triclopyr appeared best for overall use with the ester formulation being slightly better than the amine. Picloram was best on deciduous shrubs.

The fate of herbicides applied to brush was reported from Arizona. Davis found that of 112 pounds of fenuron applied onto a 46-acre chaparral watershed only 0.1 pound left the treated area in overland water flow. The highest concentration detected in 31 months of sampling was 11 parts per billion. Johnsen describes an apparent increase in photodecomposition rate of picloram dissolved in water with an increase in altitude above sea level.

PAPERS -

Altitude effects picloram photodecomposition. Johnsen, Thomas N., Jr. Picloram controls junipers and many other western woody plants. However, there is concern about its residues in soils and surface runoff. Since many susceptible western brush species grow over a wide range of altitudes limited tests were done in Arizona to determine if altitude might affect picloram photodecomposition rates. Replicated sealed plastic bags containing picloram in distilled water were exposed to direct sunlight at Flagstaff (7000 ft) December 12 thru 17, at Phoenix (1200 ft) January 17 thru 24, and at Tangle Creek (3000 ft) March 25 thru 26. Unexposed samples were used as standards. Biological assays were done with all samples, GLC analysis was also done with Phoenix and Tangle Creek samples. There was a 65 percent picloram reduction at Flagstaff, 15 percent at Phoenix, and 55 percent at Tangle Creek. Although there are differences in duration and time of exposure of these samples it appears that there is a relationship between picloram photodecomposition rates and altitude (air mass density) and time of year (sunlight angle of incident and duration). This would mean a possible shorter picloram residue life in runoff water at the higher altitudes in the mountainous west. Hence, there might be less problem with picloram residues at the higher elevations. Additional work is underway to verify these results. (ARS-USDA, Western Region, Rocky Mountain Forest and Range Experiment Station, Flagstaff, AZ 86001).

Tebuthiuron on junipers and oaks. Johnsen, Thomas N., Jr. Soil applications of pelleted tebuthiuron onto individual alligator, Utah junipers, Gambel, and shrub live oaks has effectively controlled these difficult to control species in Arizona. However, broadcast herbicide applications are needed in the management of these species. In the spring of 1975 tebuthiuron formulated as large tablets were applied onto plots at the rates of 0, 2, 4, and 6 lb ai/A at Drake and Mullican Place. A treatment of 4 lb ai/A of pelleted tebuthiuron was also made at Mullican Place. Drake had a dense stand of Utah junipers on a loam soil. Mullican Place had a mixed stand of a Utah juniper-pinyon overstory and a shrub live oak-manzanita understory on a clay soil. A delayed response occurred due to very little rainfall in 1975. Marked damage became evident following a wet early spring in 1976. Two growing seasons after treatment about 80 percent of the junipers were killed at Drake with each rate of herbicide applied. At Mullican Place only the 4 lb/A of pelleted tebuthiuron gave good initial control of Utah juniper. There was, however, excellent control of shrub live oak and pinyon with all the herbicide treatments. Manzanita was effectively controlled by the 4 and 6 lb rates but not the 2 lb rate. There was evidence of movement of the herbicide off the treated areas at both locations. (ARS-USDA, Western Region, Rocky Mountain Forest and Range Experiment Station, Flagstaff, AZ 86001).

Fenuron residues in stream water following a brush control treatment on a chaparral watershed (Three Bar B) in Arizona. Davis, Edwin A. A spot-treatment application of fenuron to reduce brush density and increase water yield from a chaparral watershed resulted in intermittent, very low levels of stream water contamination at the outlet of the treated catchment for 18 months. Only northeast-facing slopes (18.5 acres) of the 46.5-acre watershed were treated, and desirable browse species were spared. Fenuron pellets (112.5 lb active ingredient) were applied by hand during the last week in January to individual bushes and clumps of bushes at the rate of 20 lb ai/A. The overall application rate on the treated slopes was 6.1 lb ai/A. The soil was a gravelly sandy loam derived from granitic parent material.

Water samples selected for analysis corresponded as closely as possible with periods of precipitation. During prolonged dry periods samples were analyzed at least once monthly. Fenuron analysis was performed chemically by the standard colorimetric procedure.

At the time of treatment the soil was thoroughly moist from precipitation received during December and January. Rain commenced nine days after treatment. By the thirteenth day, accumulated rainfall was 1.59 inches and the fenuron concentration was 1 ppb. A 2.20-inch rainstorm during March increased the accumulated rainfall to 4.06 inches, but only increased the fenuron concentration in the stream water to 7 ppb. Thereafter, during the first six months, concentrations fluctuated from zero to 6 ppb. Several heavy rainstorms occurred during the following winter. From December 20 through January there were 7.30 inches of rain, and on January 31, one year after treatment, the fenuron concentration was 11 ppb. This was the maximum concentration resulting from the treatment. After 18½ months and 31.12 inches of precipitation fenuron was no longer detected. Analysis of samples continued for a period of 2 years 7 months after treatment; sampling was discontinued after a 5.72-inch rainstorm in September yielded negative results.

On the basis of 29 samples, during the 18½-month period that fenuron was detected, it is estimated that only 0.11 lb, or 0.1 percent of the 112.5 lb of applied fenuron left the watershed in the stream water. The results of this study, together with the fact that fenuron has a very low toxicity rating, indicates that the type of spot treatment applied has a very low contamination potential. (Rocky Mountain For. and Range Exp. Stn., For. Hydrology Lab., Arizona State Univ., Tempe, AZ 85281).

Krenite on oaks and junipers. Johnsen, Thomas N., Jr. Gambel oak, shrub live oak, Utah juniper, and alligator juniper are difficult to control species. Krenite was applied weekly onto Gambel oak in North Central Arizona from mid-September to after the leaves fell in 1974 and 1975 at the rates of 0, 2, 4, and 8 lb aehg in water as foliage sprays to the drip point with both boom and mist sprayers. There were five replications and the results were observed each spring and fall after treatment. A similar application was made in 1976 but no results have been observed yet. More limited trials were made on alligator and Utah juniper and shrub live oak. The mid-September to early-October applications gave excellent top growth repression of Gambel oak the year following treatment. When the leaves were just beginning to turn yellow even the 2 lb rate gave good results. However, the 4 and 8 lb rates gave the most uniform initial year results, being effective if applied from when the leaves were still green to when the leaves began to turn brown. Later applications were ineffective. Excellent control two years after treatment occurred with both the 4 and 8 lb rates applied when the leaves began to turn yellow-orange with a few green leaves still present. Krenite had no obvious effects on the evergreeen shrub live oak, Utah juniper, and alligator juniper. (ARS-USDA, Western Region, Rocky Mountain Forest and Range Experiment Station, Flagstaff, AZ 86001).

Triclopyr and Krenite on Pacific Northwest brush species. Gratkowski H., R. Stewart and H. Weatherly. A liquid formulation of Krenite, a triethylamine salt of triclopyr, and an ethylene glycol butyl ether ester of triclopyr were tested on five shrub species in southwestern Oregon. Results were compared to top kill and shrub kill obtained with a potassium salt of picloram, low volatile esters of 2,4,5-T, and similar esters of 2,4-D. All chemicals were applied as foliar sprays to drip point during late July 1974, and effects were rated and recorded during early autumn of 1974, 1975, and 1976. All chemicals except 2,4-D and 2,4,5-T were applied in water carriers; phenoxy herbicides were applied to oil-in-water emulsion carriers.

The 3 lb aegh rate of triclopyr amine was consistently among the best treatments for all species in these tests. Results, however, indicate that the ester formulation is slightly more effective than the amine on both evergreen and deciduous shrubs. A 2 to 3 lb aehg formulation of triclopyr ester should prove exceptionally effective on a broad spectrum of evergreen and deciduous brush species.

Krenite at 3 lb aehg was very effective on deciduous species but ineffective on evergreen shrubs. The 3 lb aehg rate of krenite was outstanding on California hazel; one application produced a better kill of hazel than any other chemical tested by the authors during the past 20 years. If Krenite does not retard growth of coniferous trees, this chemical should be very useful for releasing conifers from deciduous brush.

Picloram at 1 lb aehg was among the best chemicals for controlling deciduous shrubs; it was not as effective as other treatments on evergreen shrubs in this test. Three lb aehg rates of triclopyr amine or Krenite were almost as effective as the picloram treatment on deciduous brush. Phenoxy herbicides, triclopyr ester, and the 3 lb rate of triclopyr amine were more effective than 1 lb aehg of picloram on chinkapin and canyon live oak. (Pacific N.W. Forest and Range Exp. Stn., Forest Serv., U.S.D.A., Corvallis, OR 97331).

Table 1 Top kill and shrub kill obtained with herbicides as foliage sprays on evergreen brush species

Herbicide and concentration	Carrier	Golden evergreen-chinkapin 1/ Top-kill	Golden evergreen-chinkapin 1/ Plant kill	Canyon live oak 1/ Top-kill	Canyon live oak 1/ Plant kill
aehg					
3 lb 2,4,5-T	emulsion	81	0	--	--
3 lb 2,4-D	emulsion	--	--	92	0
1 lb picloram	water	24	0	51	0
1 lb triclopyr ester	water	99	45	93	0
1 lb triclopyr amine	water	95	5	86	5
3 lb triclopyr amine	water	96	25	90	5
1 lb Krenite	water	0	0	1	0
3 lb Krenite	water	0	0	26	0

1/ Second-year results on chinkapin; third-year effects on canyon live oak

2/ % kill: 100 = complete kill, 0 = no control.

Treated: 7/30, 31/74. Examined: 9/76

Table 2 Top kill and shrub kill obtained with herbicides as foliage sprays on deciduous brush species

Herbicide and concentration	Carrier	Salmonberry Top-kill	Salmonberry Plant kill	Vine maple Top-kill	Vine maple Plant kill	California hazel Top-kill	California hazel Plant kill
aehg							
3 lb 2,4,5-T	emulsion	94[1/]	25	87	5	100	21
1 lb picloram	water	94	85	98	85	93	33
1 lb triclopyr ester	water	99	33	92	15	--	--
1 lb triclopyr amine	water	90	32	65	5	93	13
3 lb triclopyr amine	water	100	95	98	30	100	47
1 lb Krenite	water	71	20	26	5	34	13
3 lb Krenite	water	98	75	70	25	87	80

1/ % kill 100 = complete kill 0 = no control

Treated 7/23-26/74

Examined 9/76

PROJECT 4

WEEDS IN HORTICULTURAL CROPS

R.H. Callihan, Project Chairman

SUMMARY -

Fifty-two research reports were submitted for the horticultural section from trials in California, Arizona, Utah, Idaho, and Texas.

Citrus, Grape and Pistachio (11 papers) - Grape injury and regrowth after direct application of herbicides to the foliage were affected more by 2,4-D than by equivalent rates of glyphosate or MSMA. In another test glyphosate provided best control of large weeds and grape response did not differ. When low dosages of these herbicides were sprayed on flowers and fruits, 2,4-D was again most toxic whereas MSMA did not affect set fruit.

Fall or spring basal trunk sprays of 2,4-D, MSMA and glyphosate did not affect foliage of pistachio or regrowth of citrange, but foliar applications of glyphosate and 2,4-D showed pronounced effect. Spring basal sprays of 2,4-D, MSMA and glyphosate resulted in sucker injury but not top injury if suckers have not been removed. Fall basal sprays of these herbicides damaged sucker growth, but top growth was not reduced. Downward movement, not upward, was generally indicated.

Several preemergence herbicides, notably EL 171, were effective for season-long weed control in a new orange planting.

Soil-applied dalapon leached in by 1.5 inches of water reduced top weight, flower number and vigor of young nectarine trees observed 20 days after application. Wine grapes were susceptible to conventional rates of simazine when used with sprinkler irrigation.

Stonefruits and Nuts (5 Papers) - Combinations of translocated herbicides as foliar sprays to stonefruit trees did not produce more phytotoxicity than did treatments with the same herbicides singly; added surfactant resulted in greater damage from glyphosate. Combinations of paraquat, diuron or simazine with trifluralin on weeds in pecan gave good broad spectrum weed control over a 6-yr period in Arizona. Spring treatments of oxyfluorofen, methazole, napropamide and dinitroanalines provided good annual weed control in second year almonds. Control of annual weeds in a variety of fruit and nut trees was good with RP 20630. In a sand culture where simazine produced slight phytotoxicity to young stonefruits, oxyfluorofen, oryzalin and FMC 25213 showed only slight phytotoxicity.

Irrigation and Soil Moisture Effects (6 papers) - Trifluralin, EPTC, oryzalin and napropamide do not move as far as water from emitters when injected into drip irrigation systems; napropamide moved furthest

and EPTC moved least, according to cupgrass indicators. Herbicidal effectiveness in tomato with drip irrigation was good but may have been partly due to the added effect of better competition from more vigorous crop plants. One-eighth inch of sprinkler irrigation was less effective than 1/2 inch or 2 inches of water for incorporating norflurazon into a fine sandy loam. Results from a similar study using pigweed and nightshade as indicators were not conclusive. Effects of surface soil moisture on oxyfluorfen and oryzalin activity were judged to be slight, and no effect was detected upon norflurazon and prodiamine. When soil was wet (12 to 16 centibars) at time of fumigation, control of nutsedge and annual weeds with 1,3 dichloropropene was poor, whereas control of annuals was better in dry (60 centibars) soil and control of nutsedge was better in medium (18 to 24 centibars) soil.

Increasing rates of sprinkler irrigation water between 1/8 and 2 inches increased the herbicidal effect of FMC 25213 upon both annual weeds and tomatoes.

Onions, Carrots, Asparagus, and Strawberries (5 papers) - Three sequential treatments generally did not improve efficacy of chloroxuron, methazole, nitrofen, oxadiazon, or phenmedipham, when compared with single applications at the same total dose; crop injury was increased with some sequentials and decreased with others. Sunflower competition with onions was detected from the first week of weed emergence through an 8-week period after onion seeding. Onion seed yield was highest in trifluralin treated plots, but ethofumesate, linuron, and napropamide reduced yields and differences in tolerance of onion and carrot inbreds to several herbicides were observed. Evaluation of several translocated and contact herbicides to determine the upper limit of use near asparagus ferns for perennial weed control showed all compounds tested to produce significant injury when direct sprays were applied. A combination of phenmedipham and chloroxuron provided good control of filaree in established sweet clover in strawberries.

Ornamentals (3 papers) - Summer application of 2 lb/A of glyphosate successfully reduced annual and perennial weed competition in scotch pine Christmas trees, without reducing a number of natural seedlings, but the addition of an earlier spring treatment was not more effective. Glyphosate, difenzoquat, bentazon, and HERC 26905 were not injurious to large leaf iceplant, and considerable tolerance to bifenox and HOE 23408 was expressed. Top weights of cotoneaster were higher and weed control costs were lower when any of several effective herbicides were used instead of hand labor for control of weeds in containers.

Soil, Timing, Layering, Incorporation (6 papers) - Plant response to simazine and dinoseb combinations with simazine was greater in a high-calcium Panoche clay loam than in lighter soils even when organic matter was lower. Applying a thin layer (1/2 inch) of soil with a rotary ditcher over trifluralin and prodiamine in orchards resulted in better weed control than when those herbicides were left uncovered on the soil surface. Delaying sprinkler irrigation for 3, 7, and 21 days after applying oryzalin or prodiamine had no apparent effect upon control of annual weeds. When three incorporation methods were used with 11 herbicide treatments, sprinkler incorporation, rotary hoe and thin layer application did not differ in effectiveness. In that study, pebulate alone or with napropamide produced the best tomato vigor and nightshade control. Another study showed pebulate and chloramben to control nightshade well when the herbicide was covered with a thin soil layer after spraying.

Tomatoes (10 papers) - Eleven preplant incorporated and five preemergence sprinkled-in herbicides, screened for efficacy on direct-seeded tomatoes were too toxic to the crop at rates sufficient for adequate pigweed and lambsquarter control. A preplant metribuzin plus pebulate combination gave better overall control of hairy nightshade, pigweed, mustard, and yellow nutsedge than 12 other treatments in direct seeded tomatoes. A study of layby treatments in tomato for preemergence control of hairy nightshade and lambsquarter showed chloramben, metribuzin and FMC 25213 to perform well. A comparison of chloramben and several experimental herbicides for postemergence activity on lambsquarter in tomatoes showed generally erratic or inadequate selectivity with all treatments. Addition of X-77 to chloramben increased activity and selectivity of that herbicide.

Injection of three fumigants at 3 inch or 9 inch depths did not result in commercially acceptable control of hairy nightshade or mustards; mustard stimulation was observed where fumigant rates were very high. In another study, a high rate of a gel formulation of methylbromide with 32% chloropicrin controlled purple nutsedge where the cap of the fumigated bed was later removed for planting.

American black nightshade and barnyard grass were controlled with alachlor or metribuzin without toxicity to direct seeded tomatoes where activated carbon was banded in the seed row. In one preplant incorporated study, pebulate or pebulate plus napropamide gave the best hairy nightshade control with acceptable tomato tolerance in a test comparing eight preplant incorporated herbicides.

Dodder and Broomrape (3 papers) - HERC 26905 controlled dodder in tomatoes better when dodder plants were beginning to attach and were less than 4 inches long than when dodder was not attached; tomato vigor was acceptable. Chloramben, pebulate, and trifluralin treatment appeared to result in fewer broomrape strikes, but at rates also slightly toxic to tomatoes. Metribuzin, napropamide, and perfluidone, in comparison with the foregoing herbicides had no effect on broomrape. In comparing chloramben, pebulate, trifluralin, metribuzin, napropamide, and perfluidone for broomrape control, the first three herbicides slightly reduced strikes but only with some tomato vigor reduction. Selectivity and control of broomrape with R-37878 were promising; MV 687 also reduced broomrape strikes slightly.

Potatoes (2 papers) - Potatoes were tolerant to effective doses of FMC 25213 when applied after root systems were well developed, but preemergence applications resulted in tuber malformations. Carryover injury on grain was also a problem. Dinitramine and metribuzin in combination effectively controlled a broad spectrum of annual weeds in potatoes.

PAPERS -

<u>The effect of three translocated herbicides on young table grapes.</u> Lange, A. and J. Schlesselman. Young table grapes containing two replications of Flame Tokay and one of Perlette were treated by spraying one half of the foliage leaving the other half to evaluate on 5/18/76. The injury was evaluated 6/2/76 and the top growth removed 6/10/76. The regrowth was rated 8/8/76. The amount of injury resulting from spraying grape foliage was greatest from 2,4-D and about equal between glyphosate and MSMA. The combination of low rates of 2,4-D and glyphosate was greater than either alone. Injury to the unsprayed foliage was greatest with 2,4-D. Total vigor of the regrowth after cutting back the top was affected most by 2,4-D and only slightly by glyphosate and probably not at all by MSMA. The combination of 2,4-D and glyphosate reflected the 2,4-D present and did not appear to be affected as much as the original appearance. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

A comparison of three postemergence herbicides applied to one-half of the foliage in grapes

		Average phytotoxicity 1/		
Herbicides	lb/A	Foliage sprayed 6/2/76	Foliage unsprayed 6/2/76	Vigor 2/ regrowth 8/8/76
glyphosate	2	4.3	0.7	9.0
glyphosate	4	5.3	0.3	7.9
glyphosate	8	6.0	0.0	7.7
2,4-D (OSA)	2	9.7	3.3	1.9
2,4-D (OSA)	4	9.0	3.3	3.4
2,4-D (OSA)	8	9.0	4.3	1.9
MSMA	2	4.3	1.0	9.0
MSMA	4	4.7	0.3	8.5
MSMA	8	5.7	0.3	9.5
glyphosate + 2,4-D	1+1	9.7	1.3	4.6
Check	-	0.0	0.0	8.9

1/ Average of 3 replications. Based on 0 to 10 scales where 0 = no effect and 10 = complete kill. Treated 5/18/76.

2/ Vigor rating of regrowth after prunning vine back to 4-6 inches on 6/2/76. Based on 0 to 10 scale where 0 = no regrowth and 10 = maximum regrowth. Treated 5/18/76.

<u>The effect of over-the-top sprays of translocated herbicides on young grapes in their second leaf.</u> Schlesselman, J., L. Nygren and A. Lange. A mixed planting of grapes which included Thompson Seedless, Red Seedless, Ribier, Flame Tokay and Perlette in each plot in their second leaf were sprayed 8/10/76 over-the-top of weeds and grapes. The weeds were large, at least knee high, usually waist high. The phytotoxicity ratings and the weed control were somewhat similar. Glyphosate

showed the most control of grasses and broadleaf weeds but was no more injurious to the grapes than the other herbicides when evaluated about one month after treatment. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect of postemergence herbicides on large weeds and second leaf grape plants

		Average ratings1/		
Herbicides	lb/A	Grass control	Broadleaf control	Phytotoxicity to grapes
glyphosate	2	5.7	3.3	4.3
glyphosate	8	7.7	10.0	7.0
MSMA	2	4.3	6.7	4.7
MSMA	8	4.3	4.3	5.0
2,4-D	2	2.0	5.3	6.0
2,4-D	8	4.3	7.0	8.0
Check	-	6.3	8.0	0.7

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

Treated 8/10/76. Evaluated 9/14/76.

The effect of spraying flowers of Thompson Seedless grapes while blooming. Lange, A., J. Schlesselman and R. Goertzen. Five year old Thompson seedless grapes in bloom were sprayed with a small atomizer, one cluster of flowers per plot on 5/17/76. New atomizers were used for each herbicide. Spraying commenced with the most dilute and proceeded through each increasing rate. The results substantiated an earlier trial which indicated 2,4-D to be much more phytotoxic to grape flowers in bloom and while setting fruit. Glyphosate began to show detrimental effects near 1 lb/A rate as seen from the decrease in weight. No symptoms occurred from any rate up to 2 lbs/A. On the other hand, 2,4-D was extremely toxic to both grapes in flower as well as already set, in the shatter stage. Extremely low rates such as 1/128 lb/A may have slightly increased bunch weight when sprayed in the shatter stage. MSMA did not affect grapes when the fruit was set. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

Table 1 The effect of low rates of three herbicides on grape bunch size when sprayed at two stages of fruit set

Herbicides	lb/A	Average ratings[1/] 50% bloom	Shatter stage
		gms	gms
glyphosate	1/8	577	386
glyphosate	1/4	300	455
glyphosate	1/2	326	513
glyphosate	1	240	617
glyphosate	2	55	452
2,4-D (OSA)	1/128	180	653
2,4-D (OSA)	1/64	137	407
2,4-D (OSA)	1/32	45	103
2,4-D (OSA)	1/16	0	0
2,4-D (OSA)	1/8	0	149
MSMA	1/4	150	472
MSMA	1	228	533
Check	-	317	495

1/ Average of 3 replications. Sprayed 5/24/76. Harvested 7/27/76.

Table 2 The effect of three herbicides on bunch shape and size when sprayed in the 50% bloom and full set (425-73-502-105-2-76)

Herbicides	lb/A	Average ratings[1/] 50% bloom	Shatter stage
glyphosate	1/8	0.0	0.0
glyphosate	1/4	0.0	0.0
glyphosate	1/2	0.0	0.0
glyphosate	1	0.0	0.3
glyphosate	2	0.5	0.5
2,4-D (OSA)	1/128	0.0	0.0
2,4-D (OSA)	1/64	4.7	0.0
2,4-D (OSA)	1/32	6.3	6.0
2,4-D (OSA)	1/16	6.8	8.0
2,4-D (OSA)	1/8	7.0	9.0
MSMA	1/4	0.0	0.0
MSMA	1	0.0	0.0
Check	-	0.6	0.0

1/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant. Sprayed 5/24/76. Evaluated 6/20/76.

The effect of translocated herbicides in young pistachio rootstocks. Nygren, L. and A. Lange. Young pistachio rootstocks heavily infested with weeds were treated with three translocated herbicides 7/29/76 and rated 9/30/76. The results indicate good control of all weeds with glyphosate at 5 lbs/A with no injury to pistachios even at 40 lbs/A applied to the weeds and the base of the pistachio trees. MSMA gave considerably less weed control and no injury up to the highest rate (10 lbs/A). As would be expected, 2,4-D gave good broadleaf weed control and some effect on grass at the highest rate. Only a slight injury occurred as a result of foliar contact of the 10 lbs/A rate on one tree out of four. Continued sprayings will be necessary to determine the degree of safety for this crop, but initial treatment at rates far in excess of use rates indicate the potential usefulness of these herbicides in pistachios. (Cooperative Extension, University of California, Parlier, CA 93648).

Herbicides	lb/A	Weed control ratings 1/ Broadleaves	Grasses	Pistachio phytotoxicity 2/
glyphosate	5	10.0	10.0	0.0
glyphosate	10	10.0	9.8	0.3
glyphosate	40	10.0	10.0	0.5
MSMA	5	8.3	6.8	0.0
MSMA	10	7.8	8.0	0.0
2,4-D (OSA)	5	9.8	3.5	0.8
2,4-D (OSA)	10	10.0	7.0	0.3
Check	-	6.3	2.8	1.0

1/ Average of four replications. Based on 0 to 10 scale where 0 = no control and 10 = complete control. Weeds present: Broadleaves--carpetweed, knotweed, pigweed; Grasses--crabgrass, watergrass, bermuda, nutsedge. Treated 7/29/76. Evaluated 9/30/76.

2/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 complete kill. Phytotoxicity a result of direct contract with foliage. Effect on trees in check result of weed competition. Treated 7/29/76. Evaluated 9/30/76.

The effect of four translocated herbicides on the subsequent growth of Troyer citrange. Lange, A. and J. Schlesselman. The foliage and trunks of three year old Troyer citrange trees were sprayed with four postemergence herbicides. One tree of a pair was sprayed 4/12/74 and the other 9/17/74. Two-thirds of the foliage was sprayed and the top 1/3 was left unsprayed. The unsprayed portion was rated for vigor of regrowth after all tops had been cut back in December 1974. The new growth was rated 3/1/75. The results show little or no effect from basal trunk sprays. When 2/3 of the foliage was sprayed with glyphosate the regrowth was affected at 2 lbs/A and eliminated at 4 lbs/A the fall (9/17/74) being more phytotoxic than the spring application 4/12/74. Spring may have been more damaging than fall for 2,4-D although the difference was not as great. Neither MSMA or MBR-1235 showed much effect, except a trace at the 4 lbs/A of MBR-12325. (Cooperative Extension, University of California, Parlier, CA 93648).

Comparative effect of translocated herbicides applied to the base of the trunk of Troyer citrange vs. 2/3 of the foliage.

			Average ratings[1/]	
Herbicides	lb/A	Area sprayed	Date sprayed: 4/12/74	9/17/74
glyphosate	2	base trunk	7.3	9.2
glyphosate	2	2/3 foliage	8.5	6.2
glyphosate	4	base trunk	8.6	9.0
glyphosate	4	2/3 foliage	2.0	1.0
2,4-D (OSA)	2	base trunk	9.5	9.2
2,4-D (OSA)	2	2/3 foliage	7.2	7.7
2,4-D (OSA)	4	base trunk	8.2	7.5
2,4-D (OSA)	4	2/3 foliage	6.5	7.7
MSMA	2	base trunk	9.6	9.7
MSMA	2	2/3 foliage	7.7	9.2
MSMA	4	base trunk	9.7	9.7
MSMA	4	2/3 foliage	7.0	8.7
MBR-12325	2	base trunk	9.0	10.0
MBR-12325	2	2/3 foliage	8.2	8.5
MBR-12325	4	base trunk	8.2	8.0
MBR-12325	4	2/3 foliage	7.6	7.0
Check	-		8.2	8.7

1/ Average of four replications. Based on 0 to 10 scale where 0 = no regrowth, 10 = greatest vigor. Rated 3/1/75.

The effect of spring basal sprays on young nectarines. Lange, A. Young Snowqueen nectarine trees lined out 1 foot apart February 10, 1975, were sprayed 5/25/75 with either 2,4-D or glyphosate in three tree plots replicated four times in a randomized block design. The suckers and trunks were wetted from the 50 gpa spray. When evaluated 7/17/75, the suckers were injured more by 2,4-D than glyphosate but the top was unaffected suggesting downward movement or little movement out of the suckers or in through the trunks. The suckers were removed 7/18/75 and the tree growth was again rated the following spring (4/26/76). There appeared to be slightly less sucker and top growth at 1/2 and 1 lb/A glyphosate. The sucker regrowth may have been slightly affected by the earlier 2,4-D spray but the top growth was not. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect of spring basal postemergence sprays to first leaf nectarines

		Average ratings				
		6/8/75	7/17/75		4/26/76	
		Annual broadleaf	Phytotoxicity		Vigor	
Herbicides	lb/A	control	Sucker	Tree	Sucker	Tree
glyphosate	1/4	0.8	0.8	0.0	9.5	9.6
glyphosate	1/2	0.0	0.2	0.0	7.4	7.4
glyphosate	1	3.8	1.5	0.2	8.5	8.6
2,4-D(OSA)	1/16	6.8	5.5	0.0	7.5	9.6
2,4-D(OSA)	1/4	8.8	4.5	0.0	7.6	9.4
2,4-D(OSA)	1	9.5	7.2	0.0	7.8	9.2

1/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant, complete weed control or most vigorous regrowth. Treated 5/25/75. Suckers removed 7/18/75.

The effect of fall applied basal sprays to young Snowqueen nectarines. Lange, A. and J. Schlesselman. Young Snowqueen nectarines in their first leaf were prepared for basal sprays by removing the foliage up to about 1 foot and divided into three replications 9/18/75. Herbicides were applied as basal sprays to the bottom 10 to 12 inches of the trunk during 98 F days and 50 F nights. Phytotoxicity ratings were made 10/20/75 and 3/14/76. A vigor rating was made 4/26/76. The results substantiate the trials applied in the spring. Glyphosate and 2,4-D showed very little if any effects even at 16 lbs/A applied directly to the trunks only. On the other hand, MSMA caused severe injury at 64 lbs/A and some effects at 32 lbs/A. Some effects on sucker growth 7 months after treatment were observed even at 16 lbs/A of MSMA. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect on first leaf nectarines with trunk sprayings of three post-emergence herbicides

Herbicides	lb/A	Average phytotoxicity[1/] 1 month	Average phytotoxicity[1/] 6 months	Average vigor[2/] 7 months Tree	Average vigor[2/] 7 months Sucker
glyphosate	4	1.0	1.0	9.4	7.8
glyphosate	16	1.3	1.0	9.7	7.0
2,4-D (OSA)	4	0.3	0.7	9.1	7.6
2,4-D (OSA)	16	0.3	1.0	9.6	6.8
MSMA	4	0.7	0.7	9.0	8.1
MSMA	16	0.3	0.7	8.9	4.6
MSMA	32	2.0	3.7	3.7	3.9
MSMA	64	5.3	6.7	0.9	5.2
Check	-	0.0	0.7	9.8	6.9

1/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill. Treated 9/18/75. Evaluated 10/20/75 and 3/14/76.

2/ Average of three replications. Based on 0 to 10 scale where 0 = no regrowth and 10 = most vigorous regrowth. Treated 9/18/75. Evaluated 4/26/76.

The effect of basal sprays of three translocated herbicides on young nectarines. Schlesselman, J. and A. Lange. The basal trunks of young Snowqueen nectarines in their second leaf were sprayed with herbicides in 50 gals/A on 5/18/76; the basal trunk and suckers were sprayed. Two weeks after spraying the suckers looked badly damaged, however, there was no effect on the untreated top growth. After a little over 2 months the trees were cut and weighed. The total weight of the tops showed some striking effects of 2,4-D (OSA) which appeared to increase the top weight at all three rates, increasing with increasing rates. The early regrowth appeared also to be affected by 2,4-D, but in a negative way. The top weight of those trees treated with glyphosate appeared slightly smaller than the untreated check trees, however, the regrowth two weeks later appeared only slightly less that the check. MSMA did not greatly affect the top weight or the regrowth ratings, suggesting little, if any, storage in the trees. The combination of low rates of glyphosate plus 2,4-D did not greatly effect the top growth, but appeared to reduce regrowth. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier CA 93648).

A comparison of three postemergence herbicides applied to the basal two feet of the trunk and suckers

Herbicides	lb/A	Ave. phytotoxicity 1/ Sucker sprayed 6/2/76	Top unsprayed 6/2/76	Average weight gms 7/27/76	2/ Vigor of regrowth 8/8/76
glyphosate	2	4.3	0.0	590	9.0
glyphosate	4	4.7	0.0	742	7.9
glyphosate	8	7.3	0.0	593	7.7
2,4-D	2	5.0	0.0	937	1.9
2,4-D	4	7.3	0.0	1022	3.4
2,4-D	8	7.7	0.0	1370	1.9
MSMA	2	3.0	0.0	947	9.0
MSMA	4	5.3	0.0	1073	8.5
MSMA	8	7.0	0.0	858	9.5
glyphosate + 2,4-D	1+1	6.3	0.0	817	4.6
Check	-	0.0	0.0	852	8.9

1/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill. Treated 5/18/76.

2/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = most vigorous regrowth. Treated 5/18/76.

A comparison of preemergence herbicides on the control of annuals and perennials in a young citrus orchard. Lange, A.H. Eleven herbicide treatments were applied 5/3/76 in strips down rows of newly planted naval orange on Trifoliate rootstock growing in a Delhi loamy sand (O.M. 0.34%, sand 88%, silt 10%, and clay 2%). Ratings were made 6/20/76, 8/6/76, 9/14/76 and 11/24/76. EL-171 gave outstanding season long control of both annual and perennial weeds. Most herbicides gave good residual grass control with the exception of the low rate of oxyfluorfen. When oryzalin was added to oxyfluorfen, better grass control was obtained. Norflurazon was somewhat weak on filaree but gave excellent season long residual grass control, as well as considerable bermudagrass control. FMC-25213 gave good early season control of broadleaf weeds but was somewhat weak at the lower rate on filaree. (Cooperative Extension, University of California, Parlier, CA 93648).

Table 1 A comparison of ten herbicide treatments for annual and perennial weed control in a young newly planted naval orange grove growing in a Delhi loamy sand

		Annual weed control ratings 1/		
		47 days		
Herbicides	lb/A	Annual broadleaves	Annual grass	Bermudagrass
terbacil + oryzalin	2+2	9.3	10.0	10.0
oxyfluorfen	2	8.8	6.5	1.2
oxyfluorfen	4	8.3	7.0	1.0
oxyfluorfen + oryzalin	2+2	8.7	8.7	7.3
FMC-25213	4	5.0	7.5	3.0
FMC-25213	8	6.5	7.5	1.0
norflurazon	2	7.2	8.8	8.5
norflurazon	4	7.3	6.3	8.3
EL-171	1/2	7.2	6.8	6.5
EL-171	2	9.5	9.8	8.5
Check	-	2.2	1.2	0.0

1/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 5/3/76. Evaluated 6/20/76.

Table 2 A comparison of ten herbicide treatments for annual weed control in a newly planted naval orange grove growing in a Delhi loamy sand

terbacil + oryzalin	2+2	4.5	9.3
oxyfluorfen	2	3.0	3.8
oxyfluorfen	4	8.7	9.3
oxyfluorfen + oryzalin	2+2	7.8	9.5
FMC-25213	4	4.5	8.0
FMC-25213	8	7.0	9.0
norflurazon	2	6.8	9.0
norflurazon	4	6.5	9.3
EL-171	1/2	9.5	8.0
EL-171	2	9.8	10.0
Check	-	0.8	0.0

1/ Average of four replications. Based on 0 to 10 scale where o = no effect and 10 = complete control. Treated 5/3/76. Evaluated 11/24/76.

<u>The effect of irrigation after dalapon application to young nectarine trees.</u> Lange, A. and J. Schlesselman. Dalapon was applied 6/17/75, 6/27/75 and 7/7/75 to the soil surface surrounding first leaf Snowqueen nectarines growing in a Hanford fine sandy loam (O.M. 0.75%, sand 59%, silt 33%, clay 0.8%). The plots were irrigated 7/7/75 for 0.2 inches and again on 7/8/75 with 0.4 inches and again 7/11/75 for a total of 1.5 inches of water. The foliage was evaluated 8/13/75, the trees for vigor 3/22/76 and for the effect on blooming 3/22/76. The trees were cut off and weighed 5/24/76.

The damage from dalapon on young trees was apparently up to and including 20 days after application under the conditions of this experiment. The results were consistent as seen in the foliar symptoms, the vigor of the tree, the number of flowers and the top weight. (Cooperative Extension, University of California, Parlier, CA 93648).

The effect of time between application and sprinkler irrigation on young nectarine trees growing in a sandy soil

Herbicides	lb/A	Days	Average ratings[1/] Phytotoxicity	Vigor	# of flowers per tree	Top weight[2/] of trees
dalapon	4	00	5.5	6.1	22.0	738
dalapon	4	10	4.1	7.8	15.8	775
dalapon	4	20	4.8	5.8	11.3	650
dalapon	16	0	7.4	3.9	2.0	363
dalapon	16	20	4.5	5.9	9.4	725
dalapon	64	10	7.9	4.1	2.0	714
dalapon	64	20	7.2	5.0	2.5	625
glyphosate	4	0	0.4	8.8	33.7	1529
glyphosate	4	10	0.5	8.5	27.9	913
glyphosate	4	20	0.2	8.9	49.1	1063
Untreated	-	--	0.6	8.8	27.9	938

1/ Average of eight replications. Based on 0 to 10 scale where 0 = no effect and 10 = all plants dead or most vigorous growth.
2/ Average weight per tree in grams.

Injury to sprinkler irrigated wine grapes. Kempen, H.M. and A.H. Lange. A trial was established on 2/26/76 to evaluate tolerance of simazine and other herbicides on two varieties of wine grapes, Ruby Cabernet and Barbera.

A 1700 acre commercial treatment on 11 varieties showed these two to be most susceptible to simazine damage on an adjacent field in 1975. Injury ratings in 1975 on the varieties grown were taken on 6/26/75 and were as follows: Ruby Cabernet 5.5; Barbera 3.5; Petit Sarah 3.5; Carignane 3.5; Missions 2.5; Petite Sarah 2.0 (different location); Ruby Red 2.0; Cabernet Sauvignon 1.5; Chenin Blanc 1.5; Grenache 1; Salvador 1 and French Columbard 1. A 4 foot strip of the 12 ft row spacing had been treated in February, 1975 with simazine at 1.6 lb/A in combination with dinoseb at 1.25 lb/A.

Trials in 1976 showed that San Joaquin Valley weather conditions were not unique in 1975 but that under sprinklers, Ruby Cabernet and Barbera varieties were susceptible to normal use rates of simazine. The trials suggest caution in use of simazine on sprinkled grapes with further evaluation needed on varietal differences. Newer, safer herbicides might substitute for simazine. (See table) (Cooperative Extension, University of California, Bakersfield and Parlier).

Injury ratings and weed control on sprinkler irrigated Barbera and Ruby Cabernet wine varieties Blackwells Corner, CA 1/

		Barbera			Ruby Cabernet			Weed control 2/	
	lb/A	4-29	5-27	7-26	4-29	5-27	7-26	4-29	9-22
Untreated	--	0	0	1.0	1.0	0	0	3.2	1.3
simazine	0.8	0.7	0	0	1.0	1.0	4.0	9.9	5.3
simazine	1.6	0.3	1.0	3.7	1.3	1.7	6.7	9.9	8.5
simazine	3.2	0.7	5.7	7.3	1.0	4.0	8.0	9.9	9.3
simazine + dimoseb	1.6 + 1 1/4	1.0	0.7	3.7	0.3	1.3	6.3	6.3	65.
simazine + napropamide	0.8 + 4	0	0	1.0	1.0	0	4.3	6.8	7.7
simazine + oryzalin	0.8 + 4	0	1.3	3.0	0.7	1.0	4.0	10	9.4
norflurazon + oxadiazon	2.5 + 4	0.3	0	0	0.7	0	0.7	9.9	8.3
norflurazon + oxadiazon	5.0 + 4	0.3	1.0	3.3	0.3	0	3.7	10	9.7
oxadiazon	4	0	0	0	0.7	0	1.0	9.9	5.8
FMC 25213 4EC	4	0	0	0	0.3	0	0	9.9	3.8
penoxalin	4	0	0.3	0	0.7	0	0.3	9.9	6.3
oxyfluorfen	4	0.3	0	0	0.3	0	0	9.9	7.0
glyphosate	4	0	0	0	0.5	0	1.0	6.9	3.8
LSD .05			1.50	1.78		1.43	1.31		

1/ Treated 2/26/76 a 6.7 ft berm of grapes spaced 7 ft by 10 ft. Plots were 14 ft long replicated three times on each variety. Vines were planted as potted vines in 1972; now trellised. Soil organic matter about 0.83%; SP = 38%; pH 7.8, ECE 0.7 millimhos, sandy clay loam 46% sand, 26% silt, 27% clay. Na = 2.9 me/l; Ca = 3.8 me/l; Mg = 0.5 me/l.

2/ Rated 0 to 10; ave. of six replications on five weed species, including Russian thistle, brome grass, sowthistle, filaree and common peppergrass.

<u>The effect of herbicide combination on the foliage of stonefruit trees.</u> Lange, A. and J. Schlesselman. A mixed planting of peaches, apricots, nectarines, plums and prunes were treated 7/9/76 by spraying 2/3 of the foliage with herbicides in 100 gal per acre. Each treatment was replicated three times. The tops were removed 8/1/76 and the regrowth evaluated 10/25/76. Combinations of glyphosate and 2,4-D did not greatly increase the phytotoxicity to <u>Prunus</u> as had been suggested in an earlier field experiment. The combination of glyphosate and MBR-12325 did not greatly effect the phytotoxicity although there was a slight increase in the average ratings. Adding 0.5% X-77 did increase the damage from glyphosate in one treatment. The effect of 2 to 4 lbs/A of glyphosate on the regrowth again emphasizes the apparent storage of glyphosate in the roots or trunk and thereby influencing regrowth. Although 2,4-D showed some effect on subsequent growth it appeared less than with glyphosate at comparable rates. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect of combinations of translocated herbicides on the regrowth of shoots after heading back several stone fruit trees twenty three days after treatment

	lb/A	Average phytotoxicity 1/
glyphosate	2	5.7
glyphosate	4	7.7
2,4-D (OSA)	2	4.0
2,4-D (OSA)	4	4.7
glyphosate + 2,4-D	1/4 + 1/2	1.3
glyphosate + 2,4-D	1/2 + 1/2	3.3
glyphosate + 2,4-D	1 + 1	5.0
glyphosate + 2,4-D	2 + 2	6.0
glyphosate + 2,4-D	1/2 + 1/4	3.0
glyphosate + 2,4-D	1 + 1/2	4.3
glyphosate + 2,4-D	2 + 2	5.3
glyphosate + MBR-12325	2 + 2	6.7
glyphosate + Surfactant	2 + 0.5%	8.0
Check	-	2.3

1/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = comlete kill. Treated 7/9/76. Tops removed 8/1/76. Evaluated 10/25/76.

<u>Herbicide combinations in pecans - Years five and six.</u> Hamilton, K.C. For the past 6 years, herbicide combinations have been applied in Western Schley pecans at Red Rock, Arizona to determine their effect on annual weeds and pecan trees. Treatments started 3 years after trees were established. In the spring and fall herbicides were applied to the soil and disked in. In summer applications of paraquat were applied to weed foliage in one herbicide treatment. Each plot contained

three trees planted 30 feet apart and herbicides were applied in a 20 ft band centered on the tree row. Treatments were replicated three times. Weeds on the area included tumble pigweed, junglerice, barnyard-grass, spiny sowthistle, and Russian thistle. Perennial weeds were controlled with spot treatments of foliar-applied herbicides. Soil of the test area contained 35% sand, 31% silt, 34% clay, and 1% organic matter. The same herbicide program was applied to the same plots each year. The test area was not cultivated but was disked in the spring and fall. Nuts were harvested by machine after frost.

Six herbicide combinations have given 94 to 100% weed control for the past 6 years (see table for 1975 and 1976 data). Irrigation was increased on the test area in 1975 and 1976 as trees matured. Three applications of paraquat were needed to control weeds resistant to trifluralin. Nut yields did not differ significantly among the six treatments in 1974. Nut yields were reduced in 1975 on trees treated with 2 lb/A of simazine reflecting the foliage chlorosis observed in previous years. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Control of summer annual weeds and yield of pecan nuts with herbicide combinations at Red Rock, Arizona

Date-herbicide	lb/A	Weed control estimated %		Nut yield lb/3 trees	
		1975	1976	1974	1975
Fall-diuron,+ Spring-triflualin	1 + 2	100	99	13	62
Fall-simazine + Spring-trifluralin	1 + 2	98	98	15	65
Fall-simazine + Spring-trifluralin and simazine	1 + 2 + 1	99	100	8	33
Spring-diruon + trifluralin	1 + 2	100	100	8	45
Spring-simazine + tribluralin	1 + 2	100	100	13	51
Spring-trifluralin + Summer-paraquat	2 + .5	94	98	12	76

Field application of herbicides for weed control in almonds. Kempen, H.M. and R. Meyer. Second year almonds were strip treated on March 17, 1976 with several herbicides. Two rows each of Nonpareil and one row of Merced or Mission were treated using trailer sprayers which applied 85 or 170 gpa using a combination of flood and flat fan nozzles. Strips were 8 ft wide and 20 to 30 trees in length, replicated two times. Use rates and twice use rates were applied by reducing tractor speeds in half. Sprinkling was accomplished within 2 days. Trees had shoots 2 to 12 inches long.

Grain sorghum, filaree, turkey mullein, tarweed, pigweed, barnyardgrass and puncture-vine were present in the test area, but not dense.

Ratings showed that oxyfluorfen gave excellent control of emerged winter species, filaree and turkey mullein and tarweed. Lower rates did not provide summer weed control but higher rates or combinations with oryzalin or napropamide did. Excepting volunteer milo, methazole gave season long control. The dinitro-anilines, oryzalin, penoxalin and USB 3153 were not active on emerged winter weeds but were active on a sparse population of summer weeds. Oryzalin seemed slightly superior of the three dinitro-anilines tested four months after treatment.

No tree injury was evident from these treatments.

Subplots 10 ft by 46 ft of simazine at 0.4 lb/A and methazole at 0.75 lb/A were placed around single trees in dinitro-aniline and untreated rows. No injury was evident from methazole but slight margin chlorosis was evident on the Mission variety from simazine.

Herbicide strip treatments on second year almonds Bakersfield, CA 1/

Treatment	lb/A	Filaree 4-29	Grain sorghum 4-29	Grain sorghum 7-27	Turkey mullein 4-29	Turkey mullein 7-27	Tarweed 4-29	Pigweed 7-27	Barnyard-grass 7-27	Puncture vine 7-27
oxyfluorfen	1	10.0	10.0	8.5	10.0	9.0	10.0	7.3	7.3	2.5
oxyfluorfen	2	10.0	10.0	9.0	10.0	8.0	10.0	8.3	6.8	6.8
oxyfluorfen	1+4	10.0	10.0	9.0	10.0	8.5	10.0	9.0	10.0	8.8
+	2+8	10.0	10.0	9.7	10.0	9.0	10.0	10.0	9.8	9.5
napropamide										
oxyfluorfen	1+4	10.0	10.0	10.0	10.0	9.0	10.0	10.0	10.0	10.0
+	2+8	10.0	10.0	10.0	10.0	8.0	10.0	10.0	10.0	9.8
oryzalin										
oxyfluorfen	3	10.0	10.0	9.0	10.0	8.5	10.0	10.0	10.0	8.9
oxyfluorfen	6	10.0	10.0	9.3	10.0	8.0	10.0	9.9	9.9	10.0
methazole	1.5	9.5	8.0	8.5	9.0	9.5	10.0	10.0	10.0	9.0
methazole	3	10.0	9.0	9.3	10.0	9.8	10.0	9.9	9.5	9.9
penoxalin	2	5.5	8.0	5.5	5.5	9.0	0	9.0	10.0	9.5
penoxalin	4	6.5	6.5	5.5	8.0	8.5	3.0	9.7	10.0	9.0
USB 3153	2	3.0	8.5	6.5	2.5	8.5	0	9.5	10.0	9.5
50 WP	4	7.5	6.0	5.5	7.0	8.8	2.0	9.0	10.0	7.0
oryzalin	2	3.5	4.0	8.0	2.5	8.0	0	10.0	10.0	10.0
oryzalin	4	3.0	8.0	7.5	0	8.0	0	10.0	10.0	9.8
Untreated	-	0	2.0	4.5	0	8.0	0	8.0	9.5	9.5
Untreated	-	3.0	2.0	5.5	0	8.0	0	8.0	9.5	5.8

1/ Treated 2/17/76; sprinkled by 3/19/76; two replications. Soil type: sandy loam O.M. = 0.93, SP = 35; pH 7.8.

<u>A comparison of RP-20630 and oxadiazon for annual weed control in young fruit and nut trees.</u> Lange, A.H. and D.T. Lillie. On 3/6/76 Old Line Washington Naval on Trifoliate, Eureka lemon on Macrophylla, Texas almond on Nemagard, Fay Elberta on Nemagard, Snowqueen nectarine on Nemagard, Laroda plum on Nemagard, Tilton apricot on Marianna-2 and Hartley walnut on Black Walnut were planted in a Delhi loamy sand (O.M. 0.34%, sand 88%, silt 10%, clay 2%). The plots were 10 ft by 22 ft with the species planted randomly placed 2 feet apart with 6 feet left between plots. On 4/3/76 the herbicides were applied in 50 gallons per acre using 8004 nozzles at 30 psi. The herbicides were incorporated by portable sprinkler with 0.6 inches of water and subsequently irrigated as necessary with TP10 drag line sprinklers operating at 40 psi. The amount of sprinkler irrigation was 8.4 inches. During the period April to November the plots received 3.69 inches rainfall.

The plots were rated for weed control 5/3/76, 6/20/76, 8/6/76, 10/4/76 and 11/24/76. At no time was there an indication of phytotoxicity. The diameter of the trees were measured on 11/25/76. The results showed excellent general broadleaf weed control at all rates up to June where bursage appeared to be resistant to both herbicides at normal rates. Even at 7½ months after application, filaree was controlled. RP-20630 appeared somewhat better than oxadiazon. Both RP-20630 and oxadiazon were better on filaree than napropamide, but napropamide appeared to give better control of bursage. (Cooperative Extension, University of California, Parlier, CA 93648).

The effect of three chemicals on the control of weeds in young fruit and nut trees

		Average weed control ratings[1/]							
Herbicides	lb/A	Broadleaf 5/3/76	Ripgut 5/3/76	Broadleaf 6/20/76	Grass 6/20/76	Bursage 8/6/76	Bermuda 8/6/76	Annual seedling grass 10/4/76	Filaree 11/24/76	Grass 11/24/76
RP-20630	1.5	8.5	10.0	4.8	10.0	3.2	6.2	8.0	6.8	8.8
RP-20630	3	7.0	9.2	6.0	10.0	4.2	7.0	8.5	8.8	9.2
RP-20630	6	9.0	7.2	7.5	9.2	4.0	7.5	9.2	9.5	9.0
RP-20630	12	9.5	10.0	8.5	10.0	7.5	6.5	9.9	9.5	9.8
RP-20630	24	10.0	9.8	9.2	10.0	8.2	8.0	10.0	10.0	9.8
oxadiazon	3	9.8	8.8	6.2	10.0	6.2	6.2	9.0	8.2	8.2
oxadiazon	6	8.8	10.0	6.5	10.0	4.2	9.2	9.2	7.2	9.5
napropamide	4	8.0	9.8	6.0	10.0	7.0	6.8	8.5	5.8	7.2
Check	-	0.0	9.0	1.0	4.0	3.8	5.0	0.8	0.8	3.2

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

<u>The effect of four herbicides applied in sand culture</u>. Lange, A. H. and J. Schlesselman. Four herbicides were applied to young fruiting trees, Santa Rosa plum, Snow Queen nectarine and Fay Elberta peach growing in 30 inch drainage pipe sections of washed river sand kept moist with drip irrigation. The herbicides diluted in 10L of water were applied at 5 ppm on 6/17/76 and the concentration was double (at each reapplication) and reapplied on 6/24/76, 7/12/76 and 8/2/76 (except simazine on the last two dates). Each treatment was replicated two times with each variety. The tree foliage and growth was rated on 7/5/76, 8/25/76, 10/6/76 and 11/25/76.

The three new herbicides showed very little detrimental effects on foliage appearance or growth. Simazine caused symptoms on foliage and slight stunting of new growth. These phytotoxic affects were transient resulting primarily from the initial application. As soon as simazine was withheld from the sand-nutrient culture the trees recovered. Sand cores taken from each container 10/15/76 showed no herbicide present. (Cooperative Extension, University of California, Parlier, CA 93648).

Comparison of four herbicides being applied in sand culture containing three stone fruit varieties

		Average 1/								
		7/5/76			8/25/76			10/6/76		
Herbicide	ppm	Plum	Nect.	Peach	Plum	Nect.	Peach	Plum	Nect.	Peach
oxyfluorfen	5 + 10 + 20 + 40	0.5	0.0	0.5	0.0	0.5	1.0	0.0	0.0	1.0
oryzalin	5 + 10 + 20 + 40	0.5	1.5	0.0	0.5	0.5	0.5	0.0	0.5	1.0
FMC 25213	5 + 10 + 20 + 40	1.5	1.5	1.5	0.5	0.0	2.0	0.0	0.5	1.5
simazine	5 + 10	3.0	6.0	4.0	3.5	4.5	3.5	1.5	2.0	1.5
Check	-	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.0	0.5

1/ Average of two replications per variety where 0 = no effect, 3 = definite pattern, 5 = chlorosis plus marginal burn or 50% stunting on new growth, 10 = complete kill. Treated 6/17, 6/24, 7/12 and 8/2 (6/17 and 6/24 -- simazine only). Evaluation made 11/25/76 -- no phytotoxicity.

The effect of injecting four herbicides through plastic irrigation emitters on the control of annual grasses. Lange, A. and J. Schlesselman. The injection of herbicides through emitters offers a simple, convenient means of controlling annual weeds. Four herbicides at 100 ppm were injected through four separate drip irrigation lines for one hour each on 7/31/75. The control of naturally distributed cupgrass was evaluated 8/29/75 by measuring the weed free area around each of 10 emitters by measuring the average diameter in centimeters. The movement of the water was also recorded.

The results indicate most herbicides do not move as far laterally as the water. The herbicide appearing to move furthest was napropamide followed by oryzalin and trifluralin. EPTC moved least in a concentration sufficient to kill cupgrass. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

A comparison of water movement and herbicide movement from Drip-eze[R] emitters at five psi injected for one hour

		Average[1/]	
Herbicides	ppm	Water movement	Herbicide movement
trifluralin	100	65.8	29.7
CPTC	100	58.7	24.5
oryzalin	100	65.2	33.9
napropamide	100	66.1	40.3
Check	-	64.0	0.0

1/ Average diameter of movement in centimeters. Treated 7/31/75. Evaluated 8/29/75.

Weed control studies with drip irrigation. Lange, A., F. Aljibury, and R. Goertzen. Interest in drip irrigation for row crops has increased with the many improved systems now available. Work with injecting agricultural chemicals through the drip systems has been minimal. The objective of this experiment was to evaluate several herbicides for annual weed control in processing tomatoes under drip and furrow irrigation.

An experiment with processing tomatoes was set up at the West Side Field Station, Five Points, California on a Panoche clay loam (O.M. 1%, sand 33%, clay 34%, silt 33%). Twenty herbicide treatments were placed under drip and furrow irrigation regimes. All treatments were power incorporated about 2 inches prior to planting with a straight tooth power tiller at 2 to 3 inch depth. Treatments and planting were 3/20/76. Six replications of each herbicide treatment under both irrigation systems were used. Treatments were placed on every other 30 inch bed. After the tomato stands were established, the center bed was split to create 60 inch beds. This method was used to facilitate subbing-up of the seedlings in the furrow rows in this clay loam soil. Drip lines were of the bi-wall type with emitter holes every 12 inches.

The first weed evaluations were made 5/28/76. Early weed control was consistently higher in the furrow plots at that time.

A continuous wetting along the drip line appeared to enhance degradation or dilution of the herbicide accounting for the lower degree of weed control of pigweed and barnyardgrass. Early control of pigweed and barnyardgrass was achieved in both furrow and drip by napropamide at 2 lbs/A, napropamide plus pebulate at 2 and 2 lbs/A, FMC-25213 at 1, 2 and 4 lbs/A and chloramben plus napropamide at 2 and 2 lbs/A. Moderate control was given by pebulate at 4 and 8 lbs/A, napropamide plus pebulate at 1 and 2 lbs/A and at 1 and 4 lbs/A. CDEC was not effective in controlling pigweed and only at the higher rate was a moderate control of barnyardgrass achieved.

Fresh fruit weights were taken 9/8/76 from selected treatments. Yields from the drip were an average 15.5% (1.2-32.8%) greater than yields from the furrow plots.

Weights among the drip herbicide plots were not significantly different. Greater variation showed up in the herbicide furrow treatments. The canopy of the tomatoes with drip irrigation were much larger and more dense, shading out much of the weed seedlings and providing more leaf area for carbohydrate manufacture. Competition by grasses was more evident in the furrow plots at the harvest. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

Table 1 Comparison of five herbicide combinations under drip and furrow irrigation systems and their effect on tomato fruit weight

		Fruit weight (lbs) 1/		
Herbicide	lb/A	Drip 2/	Furrow 3/	% difference
napropamide	1	106.0	87.4 b-c	17.5
napropamide	2	112.0	87.9 b-c	21.5
pebulate	4	120.3	80.9 c	32.8
pebulate	8	111.0	99.5 ab	10.4
napropamide + pebulate	2 + 2	113.4	102.3 ab	9.8
napropamide + pebulate	1 + 4	107.8	91.7 a-c	17.1
chloramben	1	114.3	91.8 a-c	19.7
chloramben	2	109.0	107.6 a	1.2
chloramben + napropamide	2 + 2	110.5	100.4 ab	9.1
Check	-	115.4	95.1 a-c	17.6

1/ Average of six replications. Treated 3/29/76. Evaluated 9/8/76.
2/ LSD .05 = 21.608. No significant difference
3/ LSD .05 = 16.577

Table 2 A comparison of herbicide treatments for weed control in tomatoes under drip and furrow irrigation

		Average weed control ratings 1/			
		Pigweed		Barnyardgrass	
Herbicides	lb/A	Drip	Furrow	Drip	Furrow
napropamide	1	6.8	9.4	6.2	9.4
napropamide	2	8.0	9.4	8.4	10.0
pebulate	4	8.0	8.0	6.8	8.4
pebulate	8	4.8	8.8	5.6	8.2
napropamide + pebulate	1 + 2	6.4	9.0	7.2	9.2
napropamide + pebulate	2 + 2	8.4	9.8	7.6	9.8
napropamide + pebulate	1 + 4	7.2	9.0	6.4	10.0
CDEC	1	1.6	1.2	2.8	1.0
CDEC	2	2.0	1.6	5.0	5.2
CDEC	4	3.2	2.8	5.6	3.2
FMC-25213	1	8.0	10.0	7.2	10.0
FMC-25213	2	9.6	10.0	6.6	10.0
FMC-25213	4	8.4	10.0	7.0	9.8
chloramben	1	6.0	8.0	3.2	7.8
chloramben	2	3.8	7.8	5.6	6.6
chloramben + napropamide	1 + 1	6.2	8.2	6.0	9.0
chloramben + napropamide	2 + 2	7.8	9.8	5.4	10.0
R-37878	2	1.4	7.4	4.8	9.0
R-37878	4	5.0	6.8	5.4	6.8
Check	-	3.4	2.6	3.6	3.2

1/ Average based on 0 to 10 scale where 0 = no effect and 10 = complete kill kill. Treated 3/29/76. Evaluated 5/28/76.

<u>The effect of irrigation on the residual activity of norflurazon.</u> Lange, A. and J. Schlesselman. The Hanford fine sandy loam soil (O.M. 0.6%, sand 58%, silt 32% and clay 10%) was prepared, seeded and staked off in 5 ft by 5 ft plots and sprayed 6/25/75 with norflurazon in 100 gals of water per acre. Irrigation variables were applied in 5 ft by 20 ft plots with an automatic rain simulator. Sugar beets, barley, ryegrass and safflower were seeded 9/12/75. The crops were irrigated. Rain fell (0.28 inch) 10/6/75. The plots were rated 2/27/76. Again on 9/15/76 the plots were reseeded with milo, millet, alfalfa and sugar beets and evaluated 10/22/76.

The residual activity was very high for all plots during the early evaluations. By 7/16/76 the differences due to irrigation became apparent. The results showed 1/8 inch of initial irrigation to be only partially effective in incorporating norflurazon in a Hanford fine sandy loam.

By the September 1976 seeding more differences were apparent. The break between 1/8 inch and 1/2 inch of water was more striking particularly at the 1 lb/A rate. (Cooperative Extension, University of California, Parlier, CA 93648).

Table 1. The effect of the initial irrigation on the residual activity of norflurazon

		Inches of initial irrigation					
		Milo			Millet		
Herbicides	lb/A	1/8	1/2	2	1/8	1/2	2
norflurazon	1	6.0	9.0	8.0	8.0	10.0	10.0
norflurazon	2	9.3	9.0	9.7	9.3	10.0	10.0
norflurazon	4	9.3	10.0	10.0	10.0	10.0	10.0
Check	-	1.3	1.7	0.0	1.7	1.3	0.0

Treated 6/25/75. Evaluated 7/16/76.

Table 2 The effect of the initial irrigation on the residual activity of norflurazon

		Inches of initial irrigation																	
		Milo			Millet			Alfalfa			Sugar beets			Filaree			Grass		
Herbicides	lb/A	1/8	1/2	2	1/8	1/2	2	1/8	1/2	2	1/8	1/2	2	1/8	1/2	2	1/8	1/2	2
norflurazon	1	1.7	3.0	3.7	3.0	5.7	8.7	3.0	7.7	6.7	2.0	10.0	9.3	5.0	6.3	5.3	7.0	9.7	9.0
norflurazon	2	5.0	3.3	5.3	8.7	9.0	10.0	7.3	7.7	8.3	9.3	10.0	10.0	9.3	7.3	8.3	7.7	9.7	9.7
norflurazon	4	7.2	7.0	9.3	8.5	9.7	10.0	8.0	9.7	10.0	9.7	10.0	10.0	7.7	9.3	8.8	8.3	10.0	10.0
Check	-	0.7	0.8	0.0	1.7	0.0	0.0	1.0	0.0	0.0	0.7	0.0	0.0	4.7	3.7	3.7	4.3	3.3	4.7

Treated 6/25/75. Evaluated 10/22/76.

The effect of irrigation on the activity of metribuzin. Lange, A. and J. Schlesselman. Metribuzin being considerably more soluble than many similar type preemergence herbicides should be influenced by the amount of initial irrigation. Metribuzin was applied 7/7/75 to prepared soil that had been seeded to tomato, black nightshade and hairy nightshade. The tomato seeds were planted at three different depths. The first plot evaluation for pigweed control was made 9/3/75 and for nightshade 9/10/75. There was a trend which indicated 1/2 inch irrigation was better than either 1/8 inch or 2 inches but the results were very variable. Results with nightshade were extremely variable suggesting poor control at all rates of herbicides and irrigation levels. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect of initial irrigation level on weed control with metribuzin

		Average ratings 1/					
		9/3/75 Pigweed control (Inches)			9/10/75 Nightshade vigor % (Inches)		
Herbicides	lb/A	1/8	1/2	2	1/8	1/2	2
metribuzin	1/8	6.3	8.3	6.3	63	108	56
metribuzin	1/4	8.0	9.0	8.3	79	45	100
metribuzin	1/2	8.0	9.3	9.0	106	94	56
Check	-	2.3	3.7	1.0	100	100	100

1/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill. Treated 7/7/75.

The effect of surface soil moisture on the activity of four herbicides. Lange, A. and J. Schlesselman. Herbicides were applied to wet and dry Hanford fine sandy loam soil (O.M. 0.6%, sand 58%, silt 32%, and clay 10%) which had been seeded on 7/29/75 and allowed to sit until 8/4/75 when all plots were evenly irrigated with 1 inch of water. Subsequently the plots were irrigated sufficiently to bring up the crops. On 8/18/75 and 9/3/75 the crops were evaluated. They were again seeded 6/4/76 and evaluated 7/16/76.

The results of the initial seeding showed no effect of surface soil moisture on the activity of norflurazon and prodiamine. A slight effect on oryzalin and oxyfluorfen was observed. These results were reaffirmed by the residual activity about a year after tréatment. The difference due to soil moisture would be expected to be greater if the period between application and initial irrigation had been extended. (Cooperative Extension, University of California, Parlier, CA 93648).

Table 1 The effect of soil moisture on the activity of four herbicides as measured with millet and milo

		Average vigor ratings 1/			
		Millet		Milo	
Herbicides	lb/A	Dry	Moist	Dry	Moist
norflurazon	2	2.5	2.5	2.8	3.5
oryzalin	2	7.0	8.8	5.0	7.8
oxyfluorfen	2	1.8	4.5	2.5	4.0
prodiamine	2	6.5	7.8	6.2	5.5
Check	-	9.8	9.0	8.0	6.0

1/ Average of four replications. Based on 0 to 10 scale where 0 = no growth and 10 = most vigorous growth. Treated 7/29/75. Evaluated 9/3/75. Moist = 1/8 of irrigation prior to herbicide application.

Table 2 The residual activity of four herbicides as affected by initial soil mosture

		Average vigor ratings 1/			
		Millet		Milo	
Herbicides	lb/A	Dry	Moist	Dry	Moist
norflurazon	2	8.7	10.0	4.8	4.8
oryzalin	2	8.0	7.8	5.2	4.2
oxyfluorfen	2	5.0	3.2	3.0	0.0
prodiamine	2	2.2	2.5	2.5	1.0
Check	-	2.0	0.8	1.8	0.0

1/ Average phytotoxicity of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill. Treated 7/29/75. Evaluated 7/16/76.

The amount of water required to activate FMC-25213 as measured by the phytotoxicity to tomatoes and annual weed control. Lange, A., J. Schlesselman, and R. Goertzen. The amount of initial water needed for incorporation and activation of a preemergence herbicide, FMC-25213, was studied at KHFS on a Hanford fine sandy loam, using a rain simulator. Direct seeded tomatoes and the weed seeds present in the trial area were used for the bioassay. Treatment and planting were done 6/22, evaluation 9/15.

More water was needed on the lower herbicide rates to achieve the same degree of weed control and reduced tomato stand and vigor as the higher herbicide rates with less water. A minimum of 1/2 inch was needed for commercial weed control at 1 lb/A, whereas only 1/8 inch was needed for activation at 2 and 4 lbs/A. Dominant weeds were barnyardgrass and pigweed. Tomato stand was reduced both as the amount of water was increased at any herbicidal level and as the herbicide activity was increased at any irrigation level. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect of initial irrigation on the activity of FMC-25213

			Average 1/					
			Weed control			Stand & vigor		
Herbicides	lb/A	Irrigation (inches):	1/8	1/2	2	1/8	1/2	2
FMC-25213	1		5.7	8.7	10.0	7.0	5.3	0.0
FMC-25213	2		9.7	8.7	10.0	6.7	7.7	1.3
FMC-25213	4		8.3	10.0	10.0	4.0	10.0	0.0
Check	-		0.0	0.0	1.7	9.7	7.7	1.7

1/ Average of three replications. Based on 0 to 10 scale where 0 = no control or stand and 10 = complete control or stand and most vigorous. Weeds present: barnyardgrass and pigweed. Treated 6/22/76. Evaluated 9/15/76.

Sequential vs. single postemergence treatments on weeds in onions. Kempen, H.M. Five herbicides were applied 3/13/75 and compared to treatments applied three times at approximately five day intervals (3/13/75, 3/18/75, 3/24/75), applied at 1/3 rates. Southport White Globe onions were at the two-true-leaf stage when on 3/13/75 a light infestation of London rocket 4 inches to 11 inches and flixweed 6 inches was present. Plots were 5 ft by 15 ft, replicated four times, using a K2XHSB (split block using X and 2X rates) design. All herbicides were applied with a CO_2 propelled 3-nozzle boom sprayer applying 35 gpa (1X rate) and 70 gpa (2X rate). Temperatures were 55 F., 60 F. and 65 F. at each date of application, respectively. The test area was on a San Emigdio sandy clay loam treated with DCPA preemergence at 7.5 lb/A in January and 6 lb/A on February 12, 1975.

Results are in table form. Sequential treatments causing more onion injury than single treatments included chloruxuron plus nonphytotoxic oil (NPO), oxadiazon and phenmedipham. The 2X rate of methazole was safer at sequential rates. Only at the 1X rate of oxadiazon was weed control improved from sequential treatments. Except for nitrofen 50WP, the single or multiple treatments of the other herbicides effectively controlled weeds present at rates tested.

Of interest was the comparison of chloruxuron with nonphytotoxic oil at 1% v/v versus Colloidal's Tronic wetting agent at 1/4% v/v. Greater onion injury occurred where NPO was used sequentially with chloruxuron at 1 lb/A each treatment.

Yield comparisons showed slight reductions occurred from chloruxuron plus NPO at 1 + 1 + 1, methazole at 1 1/2, phenmedipham at 1/2 + 1/2 + 1/2 and phenmedipham at 1 + 1 + 1. Chloruxuron at 6 lb/A or 2 + 2 + 2 with NPO or Tronic reduced yields severely. Relatively high injury ratings were necessary before yields were decreased (excepting methazole at 1 1/2 lb/A). (University of California, Coop. Extension, Bakersfield, CA).

Sequential vs single postemergence treatments on weeds in onions

Treatment	lb/A	Onion injury c/ 4/4/75	Onion injury c/ 4/15/75	Weed ratings c/ Flixweed 4/4/75	Weed ratings c/ London rocket 4/4/75	Weed ratings c/ Mustards 4/15/75	Yield/10 7/9/75
chloruxuron + NPOa/	3	3.0	2.8	9.3	10.0	9.5	31.9
chloruxuron + NPOa/	1+1+1	5.5	4.5	10.0	10.0	10.0	31.0
chloruxuron + Tronic b/	1+1+1	3.0	3.5	9.8	10.0	10.0	34.9
chloruxuron + NPO	6	4.8	4.5	10.0	10.0	10.0	24.9
chloruxuron + NPO	2+2+2	7.3	7.0	10.0	10.0	10.0	13.8
chloruxuron + Tronic	2+2+2	5.3	5.3	10.0	10.0	10.0	26.4
methazole	3/4	1.0	1.5	9.5	10.0	9.5	33.3
methazole	1/4+1/4+1/4	1.3	1.3	9.5	9.8	9.3	36.5
methazole	1 1/2	2.8	2.8	10.0	10.0	10.0	31.1
methazole	1/2+1/2+1/2	1.5	1.8	10.0	10.0	10.0	31.8
nitrofen + Tronic	6	0.5	0.5	0	5.5	4.8	38.0
nitrofen + Tronic	2+2+2	0.8	0.3	2.5	4.3	3.5	35.6
nitrofen + Tronic	12	0.8	0.3	3.7	6.3	5.8	39.8
nitrofen + Tronic	4+4+4	0.5	0.8	5.0	6.0	4.8	39.0
oxadiazon	1 1/2	0.8	1.0	7.3	7.0	8.0	36.0
oxadiazon	1/2+1/2+1/2	2.8	1.5	8.8	9.5	9.0	39.0
oxadiazon	3	1.5	0.8	8.8	9.8	9.3	39.4
oxadiazon	1+1+1	4.0	1.8	9.8	10.0	9.8	37.8
phenmedipham	1 1/2	3.8	2.8	9.0	9.3	8.0	32.9
phenmedipham	1/2+1/2+1/2	7.0	5.8	9.8	9.5	10.0	28.6
phenmedipham	3	5.3	4.5	9.8	10.0	9.8	33.6
phenmedipham	1+1+1	8.5	7.8	10.0	10.0	10.0	20.9
Untreated (Weeded 4/15/75)		0.0	0.0	--	--	7.5	37.1
Untreated (Weeded 3/13/75)							
LSD .05							

a/ NPO = nonphytotoxic oil @ 1%

b/ Tronic = Colloidal Tronic wetting agen @ 1/4%

c/ Injury and control ratings from 0 to 10 (0 = no effect; 10 = kill)
Mustard rating includes both flixweed and london rocket

Competition of wild common sunflower with 'Yellow granex' onions. Menges, Robert M. Wild common sunflower was seeded within rows of onions at planting. Onions were (a) kept free of weeds for the first 2, 4, 8, and 12 weeks or (b) exposed to weed competition for the same periods of time. Most of the wild common sunflower emerged from soil in the second week after seeding in warm (14 to 30C) irrigated sandy loam. The weed competed for yield of onions when weed population densities of 432/sq m existed even for the first two weeks after seeding. Reductions of 34% did not occur until weeds had competed for eight weeks after seeding, however, when the height of sunflower exceeded that of onion. The best yields occurred where onions (117/sq m) were kept weed-free for eight weeks after seeding. Yield data reflect the effects of weed competition on plant numbers, height, stem diameter and bulb size of onions. Data support the use of early-season weed control measures. (ARS, USDA, Weslaco, TX 78596).

The effect of fall applied herbicides for annual weed control and crop tolerance of spring seeded onions and sugarbeets. Stanger, C.E. Soil incorporated herbicides selective in onions and sugarbeets have consistently given better weed control than herbicides applied preemergence and shallowly incorporated under furrow irrigation. Spring applied preplant incorporated herbicides have not been favorably accepted because of moisture losses during the incorporation procedure resulting in unsatisfactory seed germination and seedling emergence without an irrigation.

This study was initiated to evaluate propham, EPTC and ethofumesate applied in November during fall bedding for selective weed control and crop tolerance to spring seeded onions and sugarbeets.

Weed species present in the trial included Hyslop wheat, Luther barley, pigweed, lambsquarters, barnyardgrass and green foxtail. The wheat and barley was broadcast seeded prior to disking the plot area. All other species of weeds were natural populations.

The herbicides were applied thru 8003 teejet nozzles mounted between the bedding shovels to apply the herbicide band on the flat soil surface and the untreated soil was thrown to a peak over the top of the treated band.

The following spring the beds were flattened and Peckham strain of Yellow Sweet Spanish variety of onions and Amalgamated AH-10 variety of sugarbeets were seeded on 22 inch rows into the treated layer of herbicide. Each treatment was replicated four times with plots eight rows wide (four onions and four sugarbeets) and 30 feet long. The plots were irrigated by furrow-type irrigation in the spring after the crop emerged.

EPTC showed very little activity on the weeds or the crop plants. Propham at 4 lbs/A resulted in excellent control of the wheat, barley, and early emerging green foxtail and barnyardgrass. It was not effective on pigweed or lambsquarters. Ethofumesate at rates of 2, 3 and 4 lbs/A was active on all weed species with good to excellent weed control at the 3 and 4 lb rates and persisted until the crop plants were well established.

Crop tolerance was excellent with propham and neither onions or sugarbeets showing any injury symptoms compared to crop plants in the control plots. Both sugarbeets and onions emerged normally in the ethofumesate treatments. Approximately 20 percent of the sugarbeets in the plots treated with ethofumesate at 3 and 4 lbs had leaves distorted and some leaf blades were united with adjacent leaf blades. This effect was only temporary and subsequent new leaves developed normally. The onions in the ethofumesate plots treated at 3 and 4 lbs appeared natural in growth until the second leaf was one to two inches long, at which time severe growth abnormalities were noted which resulted in 20 to 30 percent stand reductions. The onions which survived the initial injury recovered and later top growth and bulb development was normal. (Malheur Experiment Station, Ontario, OR 97914).

Percent weed control and crop tolerance of fall applied herbicides to spring planted onions and sugarbeets

Herbicide	Rate lbs/A	Onion injury	Sugar-beet injury	Hyslop wheat	Luther barley	Pig-weed	Lambs-quarters	Green foxtail	Barn-yard-grass
EPTC	3	0	0	20	25	10	5	30	25
EPTC	4	0	0	30	30	15	10	35	25
propham	4	0	0	98	99	0	0	96	94
etho-fumesate	2	10	0	85	80	89	85	93	92
etho-fumesate	3	45	10	96	94	94	92	98	96
	4	55	15	98	98	96	95	100	99
check	0	0	0	0	0	0	0	0	0

Rating - 0 = no effect; 100 = complete control

Effects of herbicide treatments on carrot and onion seed production. Anderson, J.L. and W.F. Campbell. In our studies on weed control in carrots and onions, five herbicides were tested at two rates each at the Farmington Field Station. DCPA, ethofumesate, linuron, napropamide, and trifluralin were soil incorporated with a spike tooth harrow April 12, 1976. Carrot (M5931 x M6000A and M5986B) and onion (M2399A and M611C) inbred roots and bulbs were planted immediately thereafter. DCPA provided good weed control at both the 9 and 13.4 kg/ha rates. Weeds remaining in the plots were primarily stinkgrass and witchgrass. Ethofumesate at 2.2 and 4.5 kg/ha gave fairly good weed control with negligible phytotoxicity to carrots or onions. Several lambsquarters were present in the ethofumesate plots. Linuron was weak in controlling annual grasses, especially at the 1.1 kg/ha rate. Carrots appeared to be quite tolerant of linuron but onions showed considerable injury to the higher rates of both linuron and napropamide. The male fertile onion inbred M611C was much more sensitive to linuron and napropamide than the male sterile inbred

M2399A. Many of the male fertile bulbs failed to develop seedstalks in these plots. If adequate pollination had not been provided by adjacent plots, onion seed yield of the linuron and napropamide plots would probably have been reduced considerably. Predominant weeds in the napropamide plots were black mustard, shephard's purse, hairy nightshade and cutleaf nightshade. Of the herbicides tested, napropamide was the only one that appeared to be phytotoxic to carrot vegetative development. Both carrot inbreds were equally susceptible to napropamide. Trifluralin provided fair weed control but like napropamide was ineffective in controlling the nightshades. There were also a few annual grasses in the trifluralin treated plots.

Data were recorded on plant height at first flowering, number of onion flowers per umbel, number of onion seeds per flower, percent abnormal flowers and seed yield. Analysis of variance indicated highly significant differences in plant height between the inbreds of both carrots and onions from the various herbicides. Napropamide significantly reduced seed stalk height of carrots, but the male sterile and surviving male fertile onions had recovered from the early phytotoxicity to the extent that reduction of plant height due to the lower rate of napropamide was not significant. The high rate of linuron significantly reduced onion seed stalk height.

Percent abnormal onion flowers and number of seed per flower were not affected by herbicide treatment.

Male Sterile M2399A onions showed a significant variation in the number of flowers per umbel. Linuron treatment caused a reduction in flower number. The high rate of ethofumesate also reduced the number of onion flowers and the flowers present were delayed in maturity.

Seed heads of the male sterile inbreds were hand harvested. Onion seed yield differences between treatments were not significant. Trends can be seen in the accompanying table, but variation between plots was so large that significant differences could not be established.

Onion seed yield was affected by herbicide treatment as shown in the table. Trifluralin treated plots yielded the highest and were superior to all other treatments except DCPA. Ethofumesate, linuron and napropamide each caused yield reductions. Yield reductions in the ethofumesate plots were the greatest and were somewhat unexpected as the only indication of phytotoxicity due to ethofumesate was a reduction in flower number and delay in maturity. Seed reduction in the linuron plots could be correlated with phytotoxicity as indicated by stunting of the leaves and seed stalk. Yield of onion seed was probably higher than it would have been if the plots had been larger or isolated. As noted above the male fertile inbred showed severe phytotoxicity when treated with napropamide, especially early in the season. If plants were not too severely injured by napropamide they appeared to make complete recovery by the end of the season. (Plant Science Department, Utah State University, Logan, Utah 84322).

Effects of herbicides on carrot and onion seed production

Treatment	Rate		Weed control a/	Plant vigor a/		Seed yield (g/48m) b/	
	ka/ha	lb/A		carrot	onion	M5931xM6000A carrot	M2399Aonion
DCPA	9	8	8.0	9.4	9.9	1814	957 ab
DCPA	13.4	12	9.0	10	10	2608	943 abc
ethofumesate	2.2	2	8.5	9.8	10	2722	695 de
ethofumesate	4.5	4	8.8	9.8	10	2183	666 e
linuron	1.1	1	6.6	9.3	9.8	2268	780 bcde
linuron	2.2	2	8.4	10	8.5	2835	652 e
napropamide	4.5	4	7.8	7.5	8.8	1871	808 bcde
napropamide	6.7	6	8.1	5	6.3	1843	850 bcde
trifluralin	0.6	0.5	7.8	9.5	10	2693	1148 a
trifluralin	0.8	0.75	7.9	9.8	10	3119	985 ab
control	--	--	3.5	8.3	10	2608	723 cde
Hand weeded	--	--	10	9.3	10	2552	907 bcd

a/ Average visula ratings at eight replications 6/28/76, rated 0 to 10 (10 = no weeds or no evidence of phytotoxicity).

b/ Onion yields not followed by a common letter are significantly different at the 5% level according to the LSD test. Carrot seed yield differences were not significant.

A comparison of phytotoxic contact and translocated herbicides to established asparagus. Lange, A.H. The competition from perennial weeds is a limiting factor in asparagus production in California. Along the coast and on the west side of the San Joaquin Valley perennial bindweed is extremely difficult to control. In the center and east side of the Valley, up into the Sacramento Delta, bermudagrass is the most important weed. In the Delta and through the Sacramento Valley bermudagrass, nutsedge and johnsongrass are responsible for heavy losses. Here, too, bindweed can be a problem. As with other perennial crops. glyphosate has shown considerable promise. The object of this study was to determine the upper limit of use of several herbicides around fern asparagus.

The herbicides were sprayed over the tops of large asparagus fern beginning to flower 7/8/73 in the first trial and at a later stage 8/3/73 in the second trial. Three 8004 nozzles at 30 psi were used to deliver the herbicide at 100 pga. The asparagus crowns were large and well established at about a 10 inch depth.

The results of the first trial showed minimal effects of 2 lbs of glyphosate or cacodylic at 8 lbs/A. Rates of 4 and 8 lbs/A glyphosate caused severe damage at 4 lbs/A and essentially complete kill at 8 lbs/A.

The second trial was sprayed on two replications of green and one replication on visibly drier mature fern in flower and fruit 8/3/73.

Evaluated three months later both 4 and 16 lbs/A of dicamba and glyphosate essentially killed the asparagus. MSMA and 2,4-D, both translocated herbicides, were less phytotoxic than glyphosate or dicamba. Likewise, Gulf 21634 and RH-2915 showed some phytotoxicity but the asparagus appeared to be recovering when rated 11/24/73. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

Table 1 A comparison of two herbicides sprayed on the fern of mature asparagus

Herbicides	lb/A	Average ratings 1/ 8/3/73	11/24/76
glyphosate	2	1.0	6.0
glyphosate	4	5.0	7.0
glyphosate	8	8.0	9.5
cacodylic acid	2	0.5	5.0
cacodylic acid	4	0.5	5.0
cacodylic acid	8	1.5	5.0
Check	-	0.0	2.5

1/ Average of two replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill with no regrowth. Treated 7/8/73

Table 2 A comparison of six herbicides sprayed on the fern of mature asparagus

Herbicides	lb/A	Average ratings 1/ 8/7/76	11/24/76
glyphosate	4	1.5	9.3
glyphosate	16	3.0	10.0
2,4-D OSA	4	4.0	5.0
2,4-D OSA	16	6.5	6.3
MSMA	4	4.0	5.7
MSMA	16	6.5	6.7
cyperquat	4	1.0	6.0
cyperquat	16	2.0	5.3
oxyfluorfen	4	3.0	6.0
oxyfluorfen	16	4.0	6.3
dicamba	4	3.5	8.3
dicamba	16	7.0	9.3
Check	-	0.0	4.7

1/ Average of two replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill with no regrowth. Treated 7/8/73.

The control of annual weeds in strawberries. Lange, A.H. Fall planted Tioga strawberries and 6 to 8 inch high weeds were sprayed 2/10/75 with five herbicide treatments in 50 gpa of water. Neither chloroxuron or nitrofen controlled well established sweet clover and filaree. When phenmedipham was added to chloroxuron, good weed control was obtained without excessive effects on the strawberry plants. (University of California, Cooperative Extension, Parlier, CA 93648).

Herbicide	lb/A	Average 1/ weed control	Phyto. to strawberries
chloroxuron	2	5.0	0.0
chloroxuron	4	1.3	0.0
chloroxuron + nitrofen	2 + 2	4.0	0.0
chloroxuron + phenmedipham	2 + 1	7.7	0.0
chloroxuron + phenmedipham	2 + 2	8.3	1.3
Check	-	0.0	0.0

1/ Average of three replications where 0 = no effect, 10 = complete kill. Weeds were sweet clover and filaree 4 to 6 inches tall when sprayed 2/10/17.

Weed control with glyphosate in Christmas trees. Mika, P.G. and H.L. Osborne. Effectiveness and time of application of glyphosate to control the weed species complex in a Scotch pine Christmas tree plantation were tested. The plantation was established in May 1974, using 2-0 nursery stock on a former pasture in Latah County, Idaho. Weeds were competing with the trees and supplying a food source for a pocket gopher population resulting in subsequent tree mortality by the gophers. The major weeds were common yarrow, buckhorn plantain, common mullein and orchardgrass with lesser amounts of other broadleaf and graminoid species. One and two year old natural seedlings of Douglas fir, grand fir and ponderosa pine were present throughout the plantation.

Glyphosate was applied at a rate of 2 lb/A in 48 gpa water using a three-nozzle back pack sprayer. The spray was directed between the tree rows. Treatments consisted of a spring application (May 12), a summer application (July 16), a fall application (September 16), all combinations of the above and a control. The study area was divided into twenty four 40 by 50 ft plots and treatments were randomly assigned. Vegetation coverage was determined at each time of herbicide application by randomly tossing a 2 by 5 dm quadrat five times per plot and estimating the vegetation cover within the quadrat. At the time of initial herbicide application (May 12) no significant difference (0.05 level) in vegetation cover existed between the plots.

Weed coverage at the time of evaluation (September 16) is presented in the accompanying table. At this time summer application was most effective for total weed control, reducing weed coverage by 50%. Treatment in both spring and summer produced no further reduction in weed coverage. Graminoids were controlled equally well by spring and summer application, this corresponding with the early growth habit of these species. However, early season application appears to be detrimental in the long run. Plots treated in the spring had more total cover than control plots, primarily due to large increases in cover by common yarrow, common mullein and buckhorn plantain. Presumably these increases result from: 1) an original lack of control, these species being either dormant plants or seeds at time of application and 2) a reduction in competing vegetation allowing better growth of these species.

Interestingly, herbicide treatment has had no significant effect to date on number of natural conifer seedlings per unit area. Impace may show up next year; however, the present results indicate that somenatural resistance to glyphosate may exist. If true, this would allow general broadcast application over conifer plantations. Tests to examine this possibility have been initiated. Evaluation of the fall treatment, long term effect of treatment on weedy vegetation cover and impact of vegetation control on crop tree vigor will be determined next year. (College of Forestry, Wildlife and Range Sciences. University of Idaho, Moscow, ID 83843).

Effect of time of application of glyphosate on weed cover in a Scotch pine plantation in Northern Idaho (evaluation date 9/16/76)

Species	Percent cover Control	Spring application (May 12, 1976)	Summer application (July 16, 1976)	Spring & summer application
Common yarrow	3.5 b[1/]	11.4 a	0.3 b	1.2 b
Buckhorn plantain	23.8 b	39.2 a	2.1 c	3.0 c
Common mullein	0.3 b	14.7 a	0.3 b	0.8 b
Other broadleaves[2/]	7.5 a, b	14.9 a	2.8 b	4.4 b
Orchardgrass	14.0 a	1.2 b	1.1 b	0.8 b
Other graminoids[3/]	12.3 a	0.8 b	0.6 b	0.0 b
Total	61.4 b	82.1 a	7.2 c	10.1 c
Conifer seedlings[4, 5/]	1.7	0.7	1.7	0.3

1/ Values in any one row with the same letter are not significantly different at the 0.05 level.

2/ Other broadleaves species were red sorrel, bull thistle, redstem filaree, common lambsquarters, henbit, chickweed, prairiestar and dandelion.

3/ Other graminoids were Kentucky bluegrass and timothy.

4/ Treatment effects were not significant for this variable. Thus no comparison of treatment means was carried out. For all other variables treatment effects were significant at the 0.05 level or better.

5/ Values for this variable express number of seedling per square meter rather than percent cover.

Tolerance of established large-leaf iceplant to six postemergence herbicides. Elmore, C.L. and W.A. Humphrey. A study was initiated November 13, 1975 on the established ornamental ground cover large-leaf iceplant to evaluate tolerance to postemergence herbicides. The herbicides were applied in 50 gallons of water per acre and replicated four times. The temperature was 80 F at application and remained between 60 F and 80 F for 48 hours. Visual phytotoxicity evaluations were made at two, four and eight weeks after application.

Injury was observed on large-leaf iceplant with HOE 23408 at 9.86 kg/ha; and bifenox at 2.24 and 4.48 kg/ha. The herbicides glyphosate, HERC 26905, difenzoquat and bentazon were not injurious for eight weeks after treatment at the rates used in this study. Bifenox at 1.12 kg/ha and HOE 23408 at 2.24 and 4.48 kg/ha did not significantly injure large-leafe iceplant. (University of California, Cooperative Extension, Davis and Orange County, CA).

Tolerance of large-leaf iceplant to six postemergence herbicides

Herbicide	Rate (kg/ha)	2 weeks	4 weeks	8 weeks
glyphosate	2.24	0.4	1.0	0.8
glyphosate	4.48	1.0	1.5	1.5
HERC. 26905	2.24	0.5	1.0	0.7
HERC. 26905	4.48	0.2	0.6	0.5
HERC. 26905	8.96	0.5	0.8	1.0
HOE 23408	2.24	1.8	1.8	1.7
HOE 23408	4.48	0.2	0.6	0.5
HOE 23408	8.96	3.5	4.2	3.5
difenzoquat	2.24	0.8	0.8	1.0
difenzoquat	4.48	0.5	1.0	0.0
bentazon	1.12	1.0	1.0	1.0
bentazon	2.24	0.5	0.5	0.3
bentazon	4.48	0.8	0.5	0.0
bifenox	1.12	1.8	2.8	1.7
bifenox	2.24	3.0	4.2	2.0
bifenox	4.48	3.2	4.2	2.5
Control	-	0.0	0.0	0.0

Phytotoxicity: 0 = no effect; 10 = dead plants

Weed control, phytotoxicity and cost analysis with herbicides in container grown ornamentals. Elmore, C.L. and W.E. Mast. A study was initiated to evaluate herbicides on container grown ornamental plants. Rooted liners of *Cotoneaster gluacophylla* Franch. were planted May 7, 1975 into a modified U.C. soil mix in gallon containers. The plants were allowed to establish until May 24 when the herbicide treatments were applied. Some of the Italian ryegrass and creeping woodsorrel had germinated before treatment and were not removed. Ten single containers were used as replications. The herbicides were applied broadcast and washed from the foliage by hand sprinkling. Weed control and phytotoxicity was visually evaluated May 31, June 6 and 29 and September 1, 1975. The weeds were hand pulled July 2 and September 4, 1975 and the time recorded for each treatment. Hand weeding costs were determined using a labor cost of $3 per hour and extrapolating the costs of 30,000 containers per acre. On September 14, 1975 the plant tops were harvested for dry weights.

The control of existing weeds was slow except with those herbicides having some postemergence (oxadiazon, oxyfluorfen) or root absorption (simazine) activity. After a hand weeding, all herbicides except napropamide at 4.48 kg/ha, oxyfluorfen at 2.24 kg/ha and nitrofen at 4.48 kg/ha gave good weed control.

Perfluidone at 17.92 kg/ha gave unacceptable injury to *C. glaucophylla* in this test. All other herbicides did not significantly injure *C. glaucophylla*. When the weeds remained in the container, severe plant injury and weed competition also resulted.

All herbicides significantly reduced the costs of hand weeding.

Top weights of *C. glaucophylla* in almost all cases were significantly higher when treated with herbicides than either a hand weeded or the unweeded controls. Treatment of perfluidone, simazine and nitrofen plus oryzalin were not significantly different than the reduced top weights of the controls. (University of California, Botany Department, Davis, CA 95616).

Weed control, costs of weeding, phytotoxicity, and effect on plant-top dry weights from herbicides

Herbicide	Rate kg/ha	Weed control[1]			$/A[2]		Phytotoxicity[3]		Dry wt (gms)[4]
		6/6	6/29	9/1	7/2	9/4	6/29	9/1	9/14
napropamide	4.48	3	5	10.0	80.00	0	0	0.7	11.0 bc
napropamide	8.96	7	8	10.0	25.00	0	0	0.5	13.0 ab
napropamide	17.92	6	8	10.0	31.65	0	0	0.8	11.1 bc
oxadiazon	4.48	8	8	10.0	81.65	0	0	0.3	10.6 bc
oxadiazon	8.96	9	9.5	10.0	60.80	0	0	1.7	9.3 cde
USB 3153	4.48	3	9.5	10.0	8.75	0	0	1.7	9.1 cde
USB 3153	8.96	4	10.0	10.0	0	0	1	1.8	7.6 cde
oryzalin	4.48	6	10.0	9.3	0	6.25	0	1.5	10.5 bc
oryzalin	8.96	3	10.0	9.7	0	2.42	0	1.4	10.6 bc
oxyfluorfen	2.24	2	5	9.8	241.65	29.67	0	0.3	13.1 ab
oxyfluorfen	4.48	7	6	10.0	111.65	0	0	0.9	13.8 ab
oxyfluorfen	8.96	8	9	10.0	60.00	0	0	0.1	15.7 a
napropamide + oxyfluorfen	4.48 + 2.24	8	9	10.0	21.65	0	0	1.1	10.3 cd
perfluidone	4.48	3	7	7.2	53.29	79.92	0	2.7	8.0 cde
perfluidone	8.96	5	9	9.7	20.42	27.58	0	2.4	6.8 def
perfluidone	17.92	9	10.0	10.0	0	0	0	4.8	3.5 f
VEL 5052	4.48	6	9	9.5	32.92	27.75	0	2.6	9.4 cde
VEL 5052	8.96	7	9	10.0	30.83	0	0	1.6	9.4 cde
metolachlor	4.48	5	9.9	10.0	10.83	0	0	1.3	8.4 cde
metolachlor	8.96	4	9.9	10.0	3.33	0	0	1.6	7.1 de
alachlor	4.48	2	9	9.7	50.80	4.50	0	1.2	7.5 cde
alachlor	8.96	4	9	8.5	33.33	21.16	0	2.6	7.4 de
simazine + alachlor	.89 + 4.48	7	9.5	10.0	48.33	0	2	1.5	9.5 cde
simazine + alachlor	1.79 + 8.96	8	9.5	9.9	8.33	0.67	2	2.3	7.8 cde
simazine	1.79	10	10.0	9.8	0	2.17	4	2.5	5.2 f
nitrofen	4.48	3	3	8.7	275.00	89.50	0	2.3	7.8 cde
nitrofen + oryzalin	4.48 + 4.48	10	10.0	10.0	0	0	0	1.8	6.3 ef
nitrofen + napropamide	4.48 + 4.48	9	9	10.0	0	0	0	1.6	8.6 cde
control (weeded)	-	0	0	10.0	525.80	21.00	0	0.2	6.2 ef
control (nonweeded)	-	0	0	0	0	0	0	3.2	4.0 f

[1] Weed control: 0 = no control, 10 = complete control
[2] Cost in dollars/acre at 30,000 cans/A and $3/hr labor
[3] Phytotoxicity: 0 = no effect, 3 = obvious symptoms, 10 = dead
[4] All means followed by the same letter were not significant at P = 0.05 level

<u>The effect of soil on the activity of selected herbicides as assayed with snap beans, milo, and tomatoes.</u> Lange, A.H. Herbicides are often used in combination for controlling weeds in orchards. Several combinations were evaluated by applying herbicides diluted in water to four soils in which three crops had been seeded 10/15/75. Phytotoxicity ratings of the crops made 11/6/75 showed no effect of these herbicides in a high O.M. silty clay loam and very little from the Yolo sandy loam except where the two herbicides were combined. Simazine was most toxic in the Panoche clay loam, a high calcium soil. The injury in this soil seemed greater with dinoseb and combinations. Although the Hanford sandy loam had the least organic matter and clay, the response of plants to simazine was less than in the heavier Panoche clay loam. (Cooperative Extension, University of California, Parlier, CA 93648).

The effect of soil type on the activity of herbicides on beans, milo, and tomatoes

		Sac. silty clay loam 1/			Yolo sandy loam 2/			Panoche clay loam 3/			Hanford sandy loam 4/		
Herbicide	ppm	Beans	Milo	Tomato	Beans	Milo	Tomato	Beans	Milo	Tomato	Beans	Milo	Tomato
simazine	1/8	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
simazine	¼	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	1.3	0.0	1.0	0.5
simazine	½	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	2.5	1.0	1.0	4.7
simazine	1	0.7	0.0	0.0	1.0	0.3	0.0	4.3	3.0	8.3	0.7	0.3	7.3
simazine + DNBP	¼+½	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.7	8.0	7.3	0.7	2.7
simazine + DNBP	½+1	0.3	0.0	0.0	0.0	1.0	0.0	0.0	0.3	2.3	0.0	0.3	4.3
simazine + DNBP	1+2	0.3	0.0	0.0	3.0	1.0	1.7	0.0	1.3	5.0	1.3	0.3	3.7
DNBP	1	0.3	0.0	0.0	4.7	2.0	0.3	8.3	0.7	7.7	1.3	0.0	1.3
DNBP	2	0.7	0.0	0.0	0.3	0.0	0.0	6.0	3.0	4.7	1.3	0.3	0.7
DNBP	4	0.0	0.0	1.0	0.3	0.0	0.0	2.7	1.7	7.7	0.7	2.3	1.3
DNBP	8	0.0	0.0	0.0	5.3	3.0	6.3	8.7	0.7	6.0	0.7	0.7	3.0
simazine + DNBP + Agridex	¼ + ½ + 4	0.0	0.0	0.0	0.7	1.3	5.3	4.3	1.3	5.0	4.7	2.0	10.0
simazine + DNBP + Agridex	¼ + ½ + 8	0.0	0.0	0.0	5.7	7.0	4.0	5.3	2.3	9.7	4.0	1.3	4.7
simazine + DNBP + Agridex	¼ + ½ + 16	0.0	0.0	0.0	2.3	1.7	1.7	6.0	3.7	7.7	0.0	1.7	1.5
Check	---												

Soil characteristics:
1/ O.M. 13.1%, sand 15%, silt 39%, and clay 46%
2/ O.M. 1.6%, sand 50%, silt 34%, and clay 16%.
3/ O.M. 1.1%, sand 13%, silt 40.3%, and clay 46.7%.
4/ O.M. 0.6%, sand 58%, silt 32%, and clay 10%.

The effect of timing on the activity of oryzaline and prodiamine. Lange, A. and J. Schlesselman. Two herbicides were applied to a newly prepared Hanford find sandy loam. The soil was found to have 0.93% OM, 58% sand, 34% silt and 8% clay. The dates of application were 1/8/76, 1/22/76, 1/26/76 and 1/29/76. The entire plot area was irrigated on 1/29/76 just after the last application. The maximum air temperature for this period ranged from 43 F to 76 F, averaging 65 F. No crops were seeded until 9/22/76 but weed control was evaluated 4/26/76. The control ratings suggest little lost in initial activity with a 21-day period between herbicide application and irrigation. The residual activity evaluated with crop seeded 9/22/76 indicated little loss with oryzalin, but a trend suggesting some loss in a comparable rate of prodiamine although considerable activity was present after 8 months as indicated by the phytotoxicity rating on crop and weeds. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

Table 1 The effect of a delay between herbicide application and sprinkler irrigation on annual weed control

		Average 1/ days between treatment and sprinkler irrigation			
Herbicide	lb/A	0	3	7	21
oryzalin	2	8.3	8.3	8.3	7.7
prodiamine	2	9.3	9.0	7.7	8.3
prodiamine	4	8.3	9.7	9.0	9.0
Check	-	2.7	3.0	3.3	2.3

1/ Average weed control; three reps where 0 = no effect, 10 = complete control, i.e., no live weeds.

Treated 1/8/76; evaluated 4/26/76.
Weeds present: Pineapple weed, Red maids, Filaree, Groundsel

Table 2 The effect of a delay between herbicide application and sprinkler irrigation on the residual weed control after eight months

		Average 1/ days between treatment and sprinkler irrigation			
Herbicide	lb/A	0	3	7	21
oryzalin	2	7.0	7.0	8.0	6.7
prodiamine	2	7.7	6.0	6.7	5.7
prodiamine	4	9.2	9.0	8.3	8.7
Check	-	1.0	0	0	1.0

1/ Average activity where 0 = none, 10 = complete kill. Treated 1/8/76.

Seeded 9/22/76 with milo, millet, tomato and sugar beet. There was a good stand of filaree also in the checks and some treatments as indicated.

The effect of soil moisture on activity of 1,3-dichlorpropene in a Hanford sandy loam. Goertzen, R. and A. Lange. Effect of soil moisture on the weed control activity of 1,3-dichlorpropene was evaluated on a Hanford sandy loam. Tensiometer readings at 6 inches below soil surface for the dry soil was 60 centibars, medium soil was 18 to 24 centibars and wet soil was 12 to 16 centibars. 1,3-dichlorpropene was injected 3 inches below soil surface and the soil was peaked over injection line with 18 inch border disks. The tops were knocked off with a bed shaper 6/17/76. Weed control counts were made from a 5 ft by 6 inch sample area, with the injection line the center of the 6 inches. Three sample areas from each plot were counted. All plots were furrow irrigated.

As rates of 1,3-dichlorpropene were increased, numbers of weeds were reduced. Nutsedge differences among the soil moistures were not evident. The numbers of nutsedge did decrease with good control being obtained at 100 gpa. The numbers of miscellaneous weeds increased as the soil moisture increased. Germination in the wet soils was higher and the amount of control, even with the high rates was not sufficient. A rapid decrease in total weed counts was obtained at 40 gpa in the medium and wet soils and between 40 and 60 gpa on the dry soil. (Cooperative Extension, University of California, Parlier, CA 93648).

Effect of soil moisture on activity of 1,3-dichlorpropene in a Hanford sandy loam

		Total weed count					
	Soil	Nutsedge			Misc. weeds[1/]		
GPA	moisture[2/]	Dry	Medium	Wet	Dry	Medium	Wet
X		13	0	20	105	184	347
40		4	14	9	101	67	96
60		7	3	5	8	71	120
80		6	0	5	7	46	138
100		1	0	3	4	8	80

[1/] Tumbling pigweed, barnyardgrass.
[2/] Soil moisture on date of application 6/10/76. Evaluated 7/13/76.

Thin layering for annual weed control in California orchards. Lange, A.H. and J. Schlesselman. Some surface unstable herbicides can be used in orchards if they are incorporated soon enough after application by rainfall or mechanically incorporated. Incorporation down the tree row is difficult and usually undesirable. Applying a thin layer of soil over the herbicide at or during application retains the activity and may improve residual weed control.

Herbicides were applied 1/27/76 to a Delhi loamy sand (O.M. 0.34%, sand 88%, silt 10%, clay 2%) and half of the plots were covered immediately with a rotary ditcher to a depth of 1/4 to 1/2 inch. Rain fell soon after application on 2/4/76 (to 2/9/76 for a total of 4 inches).

When the plots were evaluated 4/4/76 for sandbur control, the layered herbicide appeared to give consistently better control than the uncovered. A later evaluation on filaree control substantiated the earlier observed greater activity of the layered herbicide. Had the period between spraying and rainfall been greater, greater differences would likely have occurred. (Cooperative Extension, University of California, Parlier, CA 93648).

Effect of layering three preemergence herbicides on controlling two weed species

		Weed control[1/]			
		Sandbur 4/4/76		Filaree 10/11/76	
Herbicide	lb/A	Layered[2/]	Uncovered	Layered[2/]	Uncovered
trifluralin	4	5.3	4.6	7.8	5.0
profluralin	4	5.1	4.5	6.6	4.3
prodiamine	4	6.3	5.6	8.1	6.7
check	-		0.7		5.3

[1/] Average of three replications where 0 = no control, 10 = complete control. Treated 1/27/76. Rain 2/4-9/76 = 3.99 inches.
[2/] Herbicide covered with ¼ to ½ inch layer of untreated soil.

<u>Evaluation of incorporation methods for control of nightshade in a clay loam.</u> Goertzen, R., A. Lange, and B. Brendler. On a loam (O.M. 1.1%, clay 12.2%, silt 40.8%, sand 42%) near Fillmore, Ventura County, California, an incorporation method study was done. Three methods were used for herbicide incorporation: sprinkler only; thin layer followed by sprinkler; and rotary hoe followed by sprinkler. The thin layer was done by a PTO driven rotary ditcher which has been modified to pick up soil out of the furrow and to place it over the undisturbed herbicide layer. Approximately 1/2 inch was thrown over the chemical treatments. Hopefully, this layer prevented breakdown and was still thin enough not to let the seedlings establish without first reaching the herbicide layer. The rotary hoe was driven at 6 mph, 2 inches deep. Mechanical incorporations were done within two hours after herbicide placement. The sprinkler incorporated plots were sprinkled within two days after treatments.

No significant difference was observable among the three incorporation methods.

Pebulate at 4 lbs/A had the most vigorous tomatoes. Next best were pebulate at 8 lbs/A, pebulate plus napropamide at 4 plus 4 lbs/A and 4 plus 2 lbs/A, napropamide at 2 lbs/A and napropamide plus chloramben at 2 and 4 lbs/A. Marginal reduction in tomato vigor was obtained from napropamide at 4 lb/A, chloramben plus napropamide at 2 and 2 lbs/A and FMC-25213 plus napropamide at 1 and 2 lbs/A.

Severe vigor reduction was produced by FMC-25213 at 2 lbs/A and FMC-25213 plus napropamide at 2 and 4 lbs/A. Vigor was most severely reduced in all FMC-25213 plots due to this herbicide.

Best nightshade control as of 7/27 was obtained by plots with FMC-25213, however, these had the least vigorous tomatoes. Next best control were those plots with pebulate. Plots with chloramben and napropamide (only) did not show sufficient nightshade control. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

The effect of incorporation method on the activity of herbicides and combinations as expressed by tomato vigor and nightshade control

Herbicides	lb/A	Vigor 2/	Sprinkler No. of NS/plot	Average 1/ Ditcher NS/plot	Rotary hoe NS/plot	Nightshade 3/ control 7/27/76
pebulate	4	8.6	0.5	0.7	0.0	6.9
pebulate	8	8.3	0.7	0.2	0.0	6.7
napropamide	2	7.6	0.2	1.0	0.5	6.1
napropamide	4	7.4	1.3	1.8	1.2	4.7
pebulate + napropamide	4 4	7.9	0.5	0.7	0.7	7.0
pebulate + napropamide	2 4	8.2	0.5	0.0	1.3	7.1
chloramben + napropamide	2 2	7.2	0.8	0.0	0.8	6.2
chloramben + napropamide	2 4	7.6	1.5	0.0	0.0	6.4
FMC-25213	2	3.3	0.8	0.0	-	7.6
FMC-25213 + napropamide	1 2	5.7	0.5	0.2	0.3	7.6
FMC-25213 + napropamide	2 4	2.3	0.8	0.0	0.0	8.1
Check	-	6.7	1.3	0.7	1.0	6.2

1/ Average of six replications. Based on 0 to 10 scale where 0 = no stand or no growth and 10 = most vigorous. Evaluated 6/8/76. Treated 3/24/76. Soil: O.M. 1.1%, Clay 17.2%, Silt 40.8%, Sand 42.9%.

2/ No significant difference among sprinkler, ditcher and Lilliston tomato vigor.

3/ Average control all methods of incorporation.

<u>The effect of thin layered herbicides on the control of hairy nightshade.</u> Bendixen, W., R. Goertzen and A. Lange. Five herbicides, plus one combination of herbicides, were applied with a CO_2 backpack and incorporated using a rotary ditcher. This machine throws a thin layer (1/4 to 3/4 inch depending on soil composition and moisture) on top of the herbicide layer protecting the concentrated layer of chemical and also prevents volatilization. The soil series is an Elder sandy loam with O.M. 0.78%. Moisture was intermediate. The soil layer was 1/2 inch thick where the seed line was on the preformed bed. The best treatments were with chloramben at 4 lbs/A, and at 2 lbs/A. The next best chemical was pebulate at 8 lbs/A. Adding other herbicides in combination did not significantly increase the activity of pebulate. Marginal control of nightshade was obtained by pebulate at 4 lb/A and FMC-25213 at both 1 and 2 lbs/A. R-37878 at 1 and 4 lb/A and napropamide at 2 and 4 lb/A did not control hairy nightshade. (Cooperative Extension, University of California, P.O. Box 697, Santa Maria, CA 93454).

The effect of thin layered herbicides on the control of hairy nightshade

Herbicides	lb/A	Average[1/] nightshade control
pebulate	4	6.0
pebulate	8	7.5
napropamide	2	0.8
napropamide	4	0.8
pebulate + napropamide	4 + 2	4.2
pebulate + napropamide	4 + 4	3.2
pebulate + napropamide	8 + 2	8.2
pebulate + napropamide	8 + 4	7.0
chloramben	2	9.0
chloramben	4	10.0
FMC-25213	1	5.5
FMC-25213	2	7.0
R-37878	1	0.5
R-37878	4	3.2
Check	-	1.0
Check	-	0.2

1/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of weeds. Hairy nightshade (*Solanum sarrachoides*). Treated 4/1/76. Evaluated 5/20/76.

Preplant incorporated herbicide screening in direct seeded tomatoes. Lange, A., B. Fischer and R. Goertzen. Eleven chemicals were compared as preplant incorporated herbicides to a standard tomato herbicide, napropamide, for phytotoxicity to tomato seedlings and for weed control evaluations. This trial was conducted at the West Side Field Station, Fresno County, which has a Panoche clay loam with O.M. 1%, sand 33%, silt 33% and clay 34%. Treatments and planting were on 5/12/76, evaluations on 6/16/76. All treatments showed some degree, from moderate to excellent, of pigweed and lambsquarter control, however, most were too phytotoxic to tomatoes. Marginal safety with some weed control was shown by RH-6201 and pebulate + R-37878 combinations. R-37878 showed excellent safety for tomatoes, but weed control was poor. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

A comparison of twelve preplant incorporated herbicides for lambsquarter and pigweed control in direct seeded processing tomatoes

		Average ratings 1/					
		Tomato phytotoxicity			Pigweed	Lambsquarter	
Herbicides	lb/A	6/4	6/16	6/28	6/4	6/16	6/28
napropamide	1	1.8	0.5	1.0	9.2	9.0	8.5
napropamide	2	1.0	1.3	0.3	9.8	9.0	9.3
FMC-25213	2	3.8	3.3	3.3	10.0	9.8	8.3
FMC-25213	4	3.2	3.3	3.8	9.8	9.0	8.5
R-37878	2	0.5	0.0	0.0	5.2	5.3	4.5
R-37878	4	1.5	0.0	0.8	7.0	4.3	3.0
R-33669	1	8.5	8.3	8.8	10.0	9.8	9.8
R-33669	2	10.0	10.0	10.0	10.0	10.0	10.0
R-36548	2	6.8	6.3	6.0	9.8	8.3	8.5
R-36548	4	9.5	8.8	9.0	9.8	9.5	9.5
MV-687	2	5.8	5.8	6.8	7.8	6.0	4.8
MV-687	4	7.5	7.8	8.8	8.2	6.8	4.3
HER-26910	2	5.2	5.0	4.8	8.8	6.3	5.0
HER-26910	4	8.2	7.3	8.0	10.0	7.8	6.3
RH-6201	1/2	3.2	2.0	1.0	6.8	5.8	3.3
RH-6201	1	2.8	3.0	2.5	7.8	5.0	4.3
EPTC (encapsulated)	1	3.2	2.8	1.3	7.0	4.5	3.8
EPTC (encapsulated)	2	4.2	0.7	4.5	8.2	5.3	5.5
R-24191	1	7.8	7.3	8.0	9.2	9.0	7.5
R-24191	2	10.0	10.0	9.8	9.5	9.0	9.8
bensulide+pebulate	4+4	3.0	1.5	2.3	9.5	9.0	9.0
bensulide+pebulate	8+4	4.2	4.8	4.3	10.0	9.3	9.5
R-37878+pebulate	2+4	3.0	0.5	1.0	8.8	5.5	4.5
R-37878+pebulate	2+2	2.8	1.0	1.8	7.2	6.0	3.8
Check	-	1.0	0.0	0.0	4.8	2.8	3.5

1/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete weed control or complete kill of plant. Planted 5/12/76. Treated 5/12/76.

An evaluation of several herbicides with postemergence activity applied preemergence on direct seeded processing tomatoes. Lange, A.H., B.B. Fischer and R. Goertzen. Thirty inch beds were preshaped and seeded with VF 145 processing tomatoes 5/12/76 just prior to application of the herbicides. Sprinkler irrigation was applied 5/13/76. The plots were evaluated for phytotoxicity to young seedling tomatoes 6/4/76 and for control of millet, simulating barnyardgrass 6/16/76. No dodder occurred in this trial.

All the herbicides were active on tomatoes preemergence except bentazon and HOE-23408. Bentazon was not active on millet preemergence.

Applied preemergence, HER-26905 was too active in this rather heavy loam, low in organic matter. Likewise, FMC-25213 and oxyfluorfen were too active at the lowest rate evaluated. (Cooperative Extension, University of California, Parlier, CA 93648).

The effect of five herbicides applied and sprinkler incorporated on the phytotoxicity to direct seeded processing tomatoes in a Panoche clay loam simulated dodder-tomato screening

		Average 1/	
Herbicide	lb/A	tomato phyto.	millet
HER 26905	2	9.8	10.0
HER 26905	8	10.0	10.0
FMC 25213	2	5.2	10.0
FMC 25213	4	6.8	10.0
oxyfluorfen	2	10.0	10.0
oxyfluorfen	4	10.0	10.0
bentazon	1	0.2	0.2
bentazon	4	1.2	3.5
HOE 23408	1	1.5	10.0
HOE 23408	4	0.5	10.0
Check	-	0.0	0.0

1/ Average of four replications where 0 = no effect, 10 = complete loss of stand or growth.

Evaluated 6/4/76 and 6/16/76; treated 5/12/76; irrigated 5/13/76.

No dodder present in plots. The soil was a Panoche clay loam 1% O.M., 24% sand, 36% silt, and 40% clay.

A comparison of preplant incorporated herbicides for weed control in tomato. Agamalian, H., A. Hange and R. Goertzen. A preplant incorporated trial was established 6/22/76 on a Lockwood clay loam in central Monterey County. All treatments were straight tooth power incorporated and direct seeded to VFN bush variety tomatoes. Volumes applied per 75 sq ft plot were 400 ml (~75 gal per treated acre). All plots were sprinkler irrigated 6/22/76.

Overall best control of all four weed species rated and with the lowest tomato phytotoxicity was with metribuzin plus pebulate at 1/2 and 4 lbs/A. All other treatments were either weak in controlling one or more weed species present or were too phytotoxic to tomatoes.

Good control of hairy nightshade and yellow nutsedge was gotten with MV-687. But as better control was obtained by increasing the rate, phytotoxicity was increased in tomatoes. MV-687 was weak on mustard and erratic on pigweed.

Pebulate plus napropamide (4 + 2 lbs) and pebulate plus CDEC gave good control of hairy nightshade and pigweed, but were weak on mustard and nutsedge. No phytotoxicity to tomatoes due to herbicides was evident.

Pebulate plus diphenamid at 4 + 5 lbs/A was effective on pigweed and nutsedge without tomato phytotoxicity. Chloramben was effective in controlling pigweed only and moderately so on mustard. No phytotoxicity to tomatoes was observed.

FMC-25213 strongly controlled pigweed and mustard at all rates. Control on yellow nutsedge was increased as rates were increased, with the highest rate, 2 lbs/A, giving acceptable control. No phytotoxicity was observed.

Metribuzin plus napropamide at 1/2 and 2 lbs/A and metribuzin plus diphenamid at 1/2 plus 5 lbs/A gave excellent control of pigweed and mustard, with some effect seen on nutsedge. Little phytotoxicity was recorded.

To achieve good control of nightshade seemed to result in increased phytotoxicity to tomatoes. Control ratings of nutsedge tend to be erratic, possibly due to non-uniform stands of yellow nutsedge as seen by the variations in the check plots. (Cooperative Extension, University of California, 118 Wilgart Way, Salinas, CA 93901).

Effect of nine chemicals used as preplant incorporated herbicides on hairy nightshade, pigweed, mustard and yellow nutsedge control and tomato phytotoxicity

		Average weed control and count 1/				
Herbicides	lb/A	Hairy nightshade	Pigweed	Mustard	Yellow nutsedge	Tomato 2/ phytotoxicity
pebulate + napropamide	4 + 2	7.5	10.0	4.5	4.5	0.5
pebulate + CDEC	4 + 4	8.0	9.5	5.3	6.3	0.5
pebulate + diphenamid	4 + 5	6.8	9.0	6.5	8.0	0.0
chloramben	3	3.8	10.0	5.0	2.0	1.5
FMC-25213	1	-	10.0	10.0	3.8	1.5
FMC-25213	1.5	2.3	10.0	10.0	4.8	0.3
FMC-25213	2	4.0	10.0	10.0	7.5	1.8
MV-687	2	8.5	8.3	2.0	8.0	2.8
MV-687	4	9.1	5.0	1.9	9.5	4.5
MV-687	6	9.8	8.8	2.0	7.3	8.0
metribuzin + napropamide	1/2 + 2	2.0	10.0	10.0	6.0	2.0
metribuzin + pebulate	1/2 + 4	8.5	10.0	9.8	7.3	1.5
metribuzin + diphenamid	1/2 + 5	4.3	10.0	10.0	5.8	1.5
Check	-	0.0	5.0	2.3	8.1	2.3
Check	-	0.0	0.0	0.0	1.3	2.3
Check	-	0.0	0.0	0.0	0.0	0.0

1/ Average of three replications. Based on 0 to 10 scale where 0 = no control or no phytotoxicity and 10 = complete weed control or most phytotoxicity. Treated and planted 6/15/76. Evaluated 7/27/76. Soil: Lockwood clay loam. Straight tooth power incorporated.

2/ Variety: VFN bush.

A comparison of layby postemergence treatments for annual weed control in young processing tomatoes. Agamalian, H., A. Lange and R. Goertzen. Five herbicides were evaluated as layby treatments in 4 inch VF 7898 fresh market tomatoes. Treatments were preemergent to the weeds and were sprinkler incorporated. The soil is a Lockwood clay loam. Plot size was 5 ft by 25 ft, replicated four times. A total chemical solution of 400 ml per plot (~75 gal/treated acre) was applied with a CO_2 backpack.

Chloramben at 3 lbs/A, metribuzin at 0.75 lb/A and FMC-25213 at 2 lbs/A gave good control of hairy nightshade and lambsquarter. Good control of lambsquarter was obtained with pebulate at 6 lbs/A, FMC-25213 at 1 lb/A, and MV-687 at 3 and 6 lbs/A. Hairy nightshade control was slightly less, but still commercially acceptable. MV-687 was erratic in nightshade control with the 3 lb rate being better than 6 lbs.

Slight phytotoxicity was seen only by metribuzin at 0.75 lbs/A. No significant difference was observed in weight of fruit. (Cooperative Extension, University of California, 118 Wilgart Way, Salinas, CA 93901).

Effect of five chemicals as layby treatments on hairy nightshade and lambsquarter control and on tomato phytotoxicity and fruit weight

		Average ratings 1/			
		Weed control 3/			
Herbicides	lb/A	Hairy nightshade	Lambsquarter	Tomato 4/ phytotoxicity	Fruit weight 2/
chloramben	3	9.8	10.0	0.5	205.0
metribuzin	3/4	10.0	10.0	2.5	185.0
pebulate	6	8.0	10.0	0.5	190.5
FMC-25213	1	7.8	10.0	0.8	205.5
FMC-25213	1.5	8.8	10.0	0.3	193.8
FMC-25213	2	9.3	9.8	0.5	205.0
MV-687	3	9.5	9.3	1.0	164.3
MV-687	6	8.8	10.0	0.5	191.5
Check	-	4.0	6.8	1.0	181.5

1/ Average of four replications. Planted 4/76. Treated 6/3/76. Evaluated 6/23/76.

2/ Total fruit from 25 ft of row.

3/ Hairy nightshade (*Solanum sarrachoides*) Lambsquarter (*Chenopodium album*). Based on 0 to 10 scale where 0 = no effect and 10 = complete control.

4/ VF 7898, four inches at treatment. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant.

Comparison of postemergence activity of six herbicide treatments on tomato phytotoxicity and lambsquarter control. Lange, A., and R. Goertzen. Six herbicide treatments, each at several rates, were evaluated for postemergence activity. Tomatoes were 1 to 1 1/2 inches tall, lambsquarter 3 to 6 inches tall. This trial was done at the West Side Field Station, Five Points, California. Maximum air temperature was above 95 F.

Previous trials showed chloramben exhibited some postemergence activity. Upon the addition of a surfactant, X-77, activity and selectivity were increased. Lambsquarter showed more injury with the addition of X-77. Injury to the tomatoes was increased, but not as much as was evident on the lambsquarter. Degrees of selectivity between lambsquarter and tomato were erratic with RH-6201 and HOE-23408. Injury was slightly less to tomato with all rates of R-33669, but appeared to show insufficient selectivity. HER-26910 did not show postemergence activity. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

A comparison of six herbicide treatments for lambsquarter control in tomatoes

Herbicides	lb/A	Average ratings 1/ Tomato phytotoxicity	Lambsquarter
chloramben	1/2	0.3	0.0
chloramben	1	0.3	0.6
chloramben	2	1.0	2.3
chloramben + X-77	1/2 + 1/2	2.3	6.3
chloramben + X-77	1 + 1/2	2.3	5.0
chloramben + X-77	2 + 1/2	2.0	7.0
HOE-23408	1/2	4.3	4.0
HOE-23408	1	1.0	5.3
HOE-23408	2	2.3	3.7
RH-6201	1/4	0.7	3.7
RH-6201	1/2	5.3	3.7
RH-6201	1	1.0	5.0
HER-26910	1/2	2.7	3.7
HER-26910	1	0.7	1.0
HER-26910	2	1.3	3.0
R-33669	1/4	3.7	5.3
R-33669	1	5.3	9.7
R-33669	2	7.7	10.0
Check	-	0.3	0.7

1/ Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete kill of plant or complete weed control. Planted 5/3/76. Treated 6/14/76. Evaluated 6/28/76. Tomatoes were 1 1/2 inches tall when sprayed.

The effect of five preemergence herbicides on purple nutsedge, hairy nightshade and tomatoes in two soils, a Hanford fine sandy loam and an Elder sandy loam. Goertzen, R., L. Nygren, and A. Lange. Five preemergence herbicides were evaluated for nutsedge and hairy nightshade control in tomatoes on two soils, a Hanford fine sandy loam (O.M. 0.1%, clay 6%, silt 22%, sand 72%) from eastern Fresno County and an Elder sandy loam (O.M. 0.78%, clay 13.7%, silt 30.8%, sand 55.5%) from central Santa Barbara County. Purple nutsedge tubers were sifted from a sandy Fresno County field soil, trimmed and five tubers planted in each pot 2 inches below the surface of the soil level. Ten seeds each of VF 65 tomatoes and hairy nightshade were placed 1/4 inch deep. The herbicides were applied diluted in water and leached with daily watering.

Pebulate at 4 ppm gave good initial nutsedge control in both soils. No nightshade control was obtained with pebulate. Tomato phytotoxicity was severe at 16 ppm. The nutsedge was delayed at 4 ppm, with only moderate control by 10/5/76. Tomato vigor was slightly less on the Elder sandy loam.

EPTC gave good control of nutsedge in both soils and control was more persistent through 10/5/76. Some selectivity in the Hanford sandy loam was shown at 4 ppm with good control of hairy nightshade and high tomato vigor. However, selectivity was not as great in the Elder sandy loam, with only marginal tomato vigor and no control of hairy nightshade at 4 ppm.

Cycloate provided only marginal safety at 4 ppm and none at 16 ppm to tomatoes. Initial control of nutsedge was achieved, but this was only a delay, for the nutsedge at the 4 ppm rates had regrown by 10/5/76. Cycloate was more active in the Hanford fine sandy loam.

Metham did not control nutsedge, as only a minor setback in vigor of the shoots was seen. Likewise, no control of hairy nightshade was evident. Metham at 16 ppm reduced tomato vigor in both soils.

The data suggested more selectivity for tomatoes with EPTC than with pebulate for nightshade control.

Molinate completely controlled nutsedge through 10/5/76 in the Elder sandy loam at 4 and 16 ppm. However, the 4 ppm in the Hanford soil did not maintain complete control, so that the nutsedge was vigorous by 10/5/76. The vigor of the tomato was more reduced in the Elder sandy loam by Molinate. Molinate seemed more selective against hairy nightshade than tomatoes in the Hanford fine sandy loam. (Cooperative Extension, University of California, 9240 S. Riverbend Ave., Parlier, CA 93648).

Table 1 The effect of five preemergence herbicides on direct seeded tomatoes growing in 46 oz cans of a Hanford fine sandy loam infested with purple nutsedge

Herbicide	ppm	Tomato[1/] vigor	Tomato[2/] weight gms	Nutsedge[3/] 9/7/76	Nightshade[3/] 10/5/76	Hairy[3/] Nightshade 10/5/76
molinate	4	7.2	6.3	10.0	2.3	7.8
molinate	16	5.2	5.6	10.0	10.0	3.0
metham	4	10.0	7.7	4.2	0.3	7.8
metham	16	3.5	3.8	4.5	0.3	7.0
cycloate	4	7.2	9.8	10.0	5.8	7.5
cycloate	16	2.5	2.4	10.0	8.0	7.0
EPTC*	4	8.2	9.9	10.0	8.3	8.8
EPTC	16	4.8	3.8	10.0	10.0	9.2
pebulate*	4	10.0	9.7	10.0	6.3	3.8
pebulate	16	2.8	3.6	10.0	9.8	-
check	-	4.2	2.1	3.2	2.0	7.2

1/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = most vigorous. Treated 8/24/76. Evaluated 9/7/76.
2/ Average of four replications. Treated 8/24/76. Evaluated 9/15/76.
3/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 9/24/76.
*Competition from nutsedge.

Table 2 The effect of five preemergence herbicides on direct seeded tomatoes growing in 46 oz cans of an Elder sandy loam infested with purple nutsedge

Herbicide	ppm	Tomato[1/] vigor	Tomato[2/] weight gms	Nutsedge[3/] 9/7/76	Nightshade[3/] 10/5/76	Hairy[3/] Nightshade 10/5/76
molinate	4	5.0	2.6	10.0	9.5	1.8
molinate	16	4.2	4.7	10.0	10.0	2.5
metham	4	9.0	7.4	6.0	0.8	0.8
metham	16	2.8	3.5	8.8	1.3	0.5
cycloate	4	6.5	6.1	10.0	5.8	4.8
cycloate	16	1.5	2.9	10.0	10.0	7.3
EPTC	4	5.5	6.2	10.0	10.0	-
EPTC	16	2.5	4.2	10.0	10.0	7.8
pebulate	4	8.5	7.5	10.0	5.8	1.3
pebulate	16	3.8	3.3	10.0	9.5	0.8
check	-	7.5	4.0	0.0	-	1.0

1/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = most vigorous. Treated 8/24/76. Evaluated 9/7/76.
2/ Average of four replications. Treated 8/24/76. Evaluated 9/15/76.
3/ Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 8/24/76.
*Competition from nutsedge.

The effect of three fumigants at two different depths on hairy nightshade and mustard control in a Lockwood clay loam. Agamalian, H., A. Lange and R. Goertzen. Three fumigants were evaluated on a Lockwood clay loam (OM 1.6%, clay 25.4%, silt 41.6% and sand 33%) for hairy nightshade control. A double shank deep injected, high peak bed method was used. The high peaked beds were made with 18 inch border disks. Two depths of injection were compared. Each plot was 50 ft long and replicated six times. The soil was dry on surface and near field capacity at injection point. The beds were "sealed" with a ring roller.

All treatments gave some control of hairy nightshade with treatments injected 3 inches below the final bed top level better than those injected 9 inches below final bed top level.

The best hairy nightshade control was obtained with 1,3-dichloropropene at 80 gpa, metham at 80 and 160 gpa and methyl isothiocynanate at 40 gpa (treated acre). However, amount of control gotten by these fumigants was not commercially acceptable. A slight effect was seen by these fumigants at their lower rates, as compared to the check.

The mustard appeared to be stimulated in those plots which received high fumigation rates. A number of factors may have contributed to the higher vigor and counts of mustard. Possibly a lack of competition from the hairy nightshade and other weeds, "stratification effect" of mustard seed coat, increased nutrient availability, reduced number or virulence of soil-borne phytopathic microorganisms specific to mustard or some unknown factor. The tomato seedlings were seemingly stunted by competition from the fast-growing mustard and not from the fumigant. However, tomatoes outgrew the stunting, with no visual differences apparent at later readings. (Cooperative Extension, University of California, 118 Wilgart Way, Salinas, CA 93901).

The effect of depth of injection below finished top on the control of hairy nightshade and black mustard in a Lockwood clay loam soil

		Average ratings[1/]			
		3 inch depth		9 inch depth	
Fumigant	gal/A	HNS	Mustard	HNS	Mustard
1,3-dichloropropene	20	3.3	5.3	3.7	2.7
1,3-dichloropropene	40	2.7	3.7	3.7	2.7
1,3-dichloropropene	80	5.0	1.3	3.3	2.3
metham	80	5.0	4.7	4.5	3.0
metham	160	5.2	5.0	5.0	3.5
methyl isothiocyanate	20	2.3	4.3	2.3	5.3
methyl isothiocyanate	40	5.0	2.3	3.7	5.3
check	-	0.0	5.0	1.1	5.1

[1/] Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = complete control. Treated 3/26/76. Evaluated 5/28/76. O.M. 1.6%, clay 25.4%, silt 41.6%, and sand 33.0%. Moisture: Field capacity.

SPECIAL NOTE: Note the apparent stimulation of mustard in the high rate of fumigant compared to the check where mustard was less vigorous.

Fumigation weed control: problems and results. Lange, A. and R. Goertzen. Several fumigants are being evaluated for their efficacy in controlling yellow and purple nutsedge and several species of nightshade. The application method used was to deeply inject the fumigant down the seed line and then to seal in the gas in high, 12 to 18 inch, peaked beds. After sufficient time has elapsed for a lethal does to accumulate or after the gas has dissipated, the clean fumigated "heart" of the peaked bed is exposed by knocking off top with a bed shaper and then planting the desired crop. Best results have been obtained when the point of fumigation injection was about 3 inches below the predetermined height of the seed line.

Two forms of methyl bromide were evaluated on a Delhi sandy loam in eastern Fresno County infested with purple nutsedge. One form contains a slow-release gel which has 66% methyl bromide and 32% chloropicrin. The second contains a slow release diluent solvent which carries 70% methyl bromide and 1% chloropicrin.

Results with methyl bromide (70%) and chloropicrin (1%) were erratic, with some effect seen at 100 lbs/A. The high rate of methyl bromide (67%) and chloropicrin (32%), 80 lbs methyl bromide per field acre, gave consistent control of nutsedge in a 10 inch band. The low rates of 40 lbs/A showed moderate stand and vigor reduction of the nutsedge. Counts were taken from a 10 inches by 60 inches (600 sq inches = 5 sq ft) band with the injection line on the center of the 10 inches. The point of injection was dry, whereas the soil thrown to make the peaked beds was at field capacity. (University of California, Cooperative Extension, Parlier, CA 93648).

A comparison of two forms of methyl bromide deeply injected into large beds, later knocked off and their effect on purple nutsedge on a Delhi loamy sand

Fumigant[3/]	Lbs/acre[2/]	Average number nutsedge[1/] Row 1	Row 2
Terr-O-Gas	50	54.5	27.3
Terr-O-Gas	100	57.5	23.5
Terr-O-Gel	40	17.0	23.5
Terr-O-Gel	80	4.5	1.0
check	-	88.6	23.0

[1/] Four samples (each 5 sq ft) taken from each of two replications per row. Treated 6/8/76. Beds shaped 6/17/76. Evaluated 7/8/76.

[2/] Single shank injection; rates given are for field acre, multiply rate given by five to get concentration does in one ft treated area on 5 ft beds. Rates are for actual weight of methyl bromide applied.

[3/] Terr-O-Gas: 70% CH_3Br, 1% chloropicrin, 29% solvent.
Terr-O-Gel: 66% CH_3Br, 32% chloropicrin, 2% gel agent.

Control of American black nightshade in direct seeded tomatoes using preemergence herbicides. Kempen, H.M. Two trials were conducted, one on loam and one on coarse, sandy soil, to evaluate preemergence herbicides. Activated carbon (Gro-Safe) was applied either (1) over the seedline and then folded in or (2) preemergence on the surface. Herbicides were applied preemergence during the week of 2/12/76 and subsequently sprinkled to germinate the tomatoes.

Activated carbon was applied at 200 to 225 lb/A on a 1 1/2 inch band in 235 gpa (5 lb in 6 gals of water per acre of tomatoes). Application into the groove where the seed was placed was easy on the coarse soil but cloddiness on the loam soil made such an application less uniform.

Herbicide plots were 20 inches by 20 ft replicated six times. Of these, two replications in one row had no carbon, two had over the seedline treatments and two were applied on the surface.

Results on the sandy loam test were nil. No effects of herbicide or carbon were evident on the ample stand of nightshade and tomatoes, when rated 3/29/76, 45 days after treatment. This was surprising since 1.5 inches of sprinkling was used to gain emergence plus a short irrigation at emergence.

The results of the test on loam soil were more encouraging. The table shows that excellent control of American black nightshade was achieved with alachlor with only slight tomato injury where activated carbon was used. More occurred when no carbon was used. Metribuzin likewise did well on the nightshade and was quite safe where carbon was used but was unsafe at 1/2 lb/A where no carbon was used. Both also controlled barnyardgrass. These weed control data were taken outside the drill row because the drill had already been hoed when evaluated on 4/24/76.

Therefore these results are only an indication of a possible control program which deserves further consideration.

Preemergence herbicides carbon for nightshade control in tomatoes on loam soil.

Main treatment	lb/A	Carbon treatment	Control of injury ratings of 4/24/76					
			ABN control		By-grass control		Tomato injury	
			1X	2X	1X	2X	1X	2X
(a) untreated	-	over seed	0	0	1.5	2.5	1.0	0
	-	surface	0	2	0	0	0	1.5
	-	none	2.3	1.8	2.5	2.0	1.0	0.3
(b) chloramben	1, 2	over seed	1.5	1.5	6.0	5.5	0	0.5
	1, 2	surface	5.0	2.5	6.0	2.0	2.5	0.5
	1, 2	none	2.5	2.5	3.0	5.0	0	4.0
(c) chloramben	4, 8	over seed	0	0	0	0	0.5	0
	4, 8	surface	0	0	3.5	2	0.5	0
	4, 8	none	0.5	1.5	3.5	4	0.5	0.5
(d) alachlor	1, 2	over seed	8.5	8.0	8.5	9.5	0.5	1.5
	1, 2	surface	10.0	9.0	9.5	8.0	0	0
	1, 2	none	6.5	9.5	6.5	9	3.5	3.5
(e) FMC 25213 4EC	1, 2	over seed	3.0	4.0	9.8	10.0	2.5	1.5
	1, 2	surface	2.0	5.0	10.0	10.0	2.0	0.5
	1, 2	none	6.5	7	9.5	9.8	2.0	3.0
(f) metribuzin	1/4, 1/2	over seed	8.0	9.5	10.0	10.0	3.5	2.5
	1/4, 1/2	surface	9.5	8.0	9.5	9.5	0.5	2.0
	1/4, 1/2	none	10.0	10.0	10.0	10.0	2.5	5.5

Loam soil; sprinkler irrigated. Treated 2/18/76.

The effect of preplant incorporated herbicides on the control of hairy nightshade in direct seeded tomatoes. Bendixen, W., R. Goertzen, and A. Lange. Eight herbicide treatments were applied to 60 inch beds on 4/27 with a CO_2 backpack at 100 gpa and shallow incorporated (1 to 1 1/2 inches) using a Lilliston rotary hoe at approximately 6 mph. VF 315 tomatoes were planted 4/29/76 and sprinkler irrigated. Evaluations were made on 6/11 and 8/27 for hairy nightshade control and tomato phytotoxicity. The soil is an Elder sandy loam with O.M. 0.78%, clay 13.7%, silt 30.8%, and sand 55.5%.

MV-687 at 4 lbs/A and oxyfluorfen at 1 lb/A gave the best nightshade control throughout the growing season, but MV-687 killed the tomato seedling and oxyfluorfen kept tomatoes severely stunted four months after application. The best hairy nightshade control, with acceptable safety to tomatoes, was shown by pebulate at 6 and 8 lbs. and pebulate plus napropamide at 6 plus 2 lbs/A and 4 plus 2 lbs/A.

Pebulate at 4 lb/A gave marginal nightshade control with no phytotoxicity to tomatoes. Oxyfluorfen at 1 and 4 lbs/A and MV-687 at 4 lbs/A were persistent up to four months after treatment. Pebulate at 6 lbs alone and with napropamide at 2 lbs gave marginal control on 8/27/76 and showed no tomato phytotoxicity. (Cooperative Extension, University of California, P.O. Box 697, Santa Maria, CA 93454).

Preplant incorporation[1/] of six herbicides and their effect on tomato phytotoxicity and nightshade control

		Average ratings[2/]			
		Hairy nightshade		Tomato phytotoxicity	
Herbicides	lb/A	6/11	8/27	6/11	8/27
pebulate	4	6.8	4.2	0.8	0.0
pebulate	6	7.0	4.5	1.8	1.5
pebulate	8	7.8	1.8	2.2	2.0
napropamide	1	2.2	0.5	0.2	2.2
napropamide	2	2.2	0.0	0.5	2.2
napropamide	4	1.8	0.0	1.0	3.5
pebulate + napropamide	4+2	7.0	2.8	1.2	3.0
pebulate + napropamide	6+2	7.5	4.8	1.2	1.8
MV-687	1	7.5	4.0	4.2	4.5
MV-687	4	9.2	8.8	9.0	10.0
R-37878	1	3.8	1.5	0.2	1.5
R-37878	4	4.5	2.8	1.5	1.8
FMC-25213	1	3.0	1.5	2.0	3.5
FMC-25213	2	4.8	1.2	4.2	4.5
FMC-25213	4	6.8	3.2	7.5	8.8
RH-6201	1/4	2.2	3.2	1.0	1.5
RH-6201	1	4.0	0.2	2.0	3.5
oxyfluorfen	1/4	7.2	5.5	6.8	5.2
oxyfluorfen	1	9.0	6.5	9.5	7.5
check	-	1.5	1.6	0.8	2.2

1/ Lilliston rotary hoe; 1 to 1½ inch.
2/ Based on 0 to 10 scale where 0 = no control or no tomato phytotoxicity and 10 = complete control or complete tomato kill. Evaluated 6/11/76 and 8/27/76. Treated 4/27/76.

<u>Timing of HER-26905 for selective dodder control in direct seeded tomatoes.</u> Fischer, B.B., R. Goertzen and A. Lange. Selective control of dodder with HER-26905 was studied with increasing ages of tomato and dodder. HER-26905 has been shown in earlier work to selectively control dodder in alfalfa and tomatoes. VF 45 tomatoes were planted 5/5/76 in a dodder infested field at the West Side Field Station, Five Points, California. Napropamide was preplant incorporated at 1 lb/A for grass control. Plot size was two 40 inches by 25 ft beds, replicated four times. Treatments were made 5/19/76, 5/24/76, 6/4/76 and 6/14/76.

Good dodder control was obtained on treatment dates 5/19/76 and 5/24/76 when dodder plants were just attaching and were less than 4 inches long. Treatments applied early gave longer lasting control throughout the season. No difference in dodder control was obtained with any rate of HER-26905 used on early treatment dates. However, tomato vigor was slightly reduced with 4 lbs/A.

Treatments applied 6/4/76 gave good dodder control as rates were increased, but were not as good as earlier treatments. Treatments applied 6/14/76 were the least effective on dodder, as the dodder was probably well established on the tomato host. The well established dodder resulted in poorer control at low rates and lower tomato vigor. HER-26905 at 4 and 8 lbs/A appeared to increase the vigor of the tomatoes by reducing the amount of dodder.

No significant difference was obtained among herbicide treatments in fruit harvested 9/21/76. However, all treatments were significantly different than the untreated check. (Cooperative Extension, University of California, 1720 S. Maple Avenue, Fresno, CA 93702).

Table 1 Dodder control in tomatoes-yield data time series and tolerance study

			Tomato yield data average			
		Date	Total yield	% of fruit		
Herbicide	lb/A	applied	lb/plot	Ripe	Green	Cull
HER-26905	1	5/19	68.3 a	60.3	34.4	5.3
HER-26905	2	5/19	77.4 a	64.6	34.0	1.3
HER-26905	4	5/19	62.9 a	65.8	31.5	2.7
HER-26905	1	5/24	78.9 a	67.2	29.2	3.7
HER-26905	4	5/24	65.9 a	55.2	40.4	4.4
HER-26905	1	6/4	66.0 a	61.2	33.8	5.0
HER-26905	4	6/4	72.0 a	62.0	31.9	5.9
HER-26905	8	6/14	72.0 a	64.3	29.4	6.3
check	-	-	34.9 a	53.9	41.8	4.3

REMARKS: The plants were cut and the fruit shaken off the vine. Red, green and cull (rotten, sunburn) fruit were sorted and weighed. Tomato planted 5/5/76 - Variety VF 45. Preplant herbicide: napropamide 1 lb/A Harvested 9/21/76.

Table 2 Dodder control in tomatoes time series and tolerance study

Herbicide	lb/A	Attached dodder	Dodder control & tomato vigor ratings 2/ 6/29/76 % dodder control	6/29/76 tomato vigor	7/28/76 % dodder control	9/2/76 % dodder control	9/2/76 tomato vigor
19 May - tomato-cotyledon-dodder attached							
HER-26905	1	(5)	85	8.0	90	90	10.0
HER-26905	2	(10)	90	8.0	90	90	10.0
HER-26905	4	(4)	90	7.2	95	90	9.5
check	-	(6)	20	8.5	10	10	4.0
24 May - tomato with one pair true leaves-dodder attached 1 to 4 inches long strands							
HER-26905	1	(6)	87	9.0	90	85	10.0
HER-26905	2	(11)	77	8.2	90	90	10.0
HER-26905	4	(8)	90	7.2	95	90	9.0
check	-	(4)	15	10.0	10	10	5.0
4 June - tomato-2 to 4 inches tall-dodder attached 1 to 11 inches long strands							
HER-26905	1	(9)	87	9.2	75	75	10.0
HER-26905	2	(11)	90	8.6	80	80	10.0
HER-26905	4	(14)	90	7.0	85	85	9.0
check	-	(15)	0	6.6	10	0	6.0
14 June - tomato 3 to 4 inches tall-dodder attached 6 to 14 inches long strands							
HER-26905	1	(15)	47	9.7	50	30	7.5
HER-26905	2	(16)	30	9.0	55	45	7.5
HER-26905	4	(21)	90	8.7	80	70	8.0
HER-26905	8	(23)	87	8.2	90	80	9.0
check	-	(21)	10	8.0	5	0	6.0

1/ Average number of attached dodder at the time of treatment in each plot.
2/ Tomato vigor rating based on a 0 to 10 scale where 0 = very poor vigor and 10 = vigorously growing plant. Tomato planted 5/5/76 - Variety VF 45. Herbicide applied postemergence; 5/19, 5/24, 6/4 and 6/14/76.

Effect of six preplant incorporated herbicides on broomrape control and on tomato transplant vigor. Lange, A. and R. Goertzen. Six herbicides were preplant incorporated for broomrape control on 6/24/76. Tomatoes were transplanted and furrow irrigated 6/28/76. The San Benito County soil is a clay with O.M. 0.57%, clay 60%, silt 30%, and sand 10%. Treatments were applied with a CO_2 backpack and power incorporated 4 inches. On 9/3/76, the tomatoes were dug up and the actively growing, viable broomrape were counted.

Chloramben at 8 lbs/A, pebulate at 8 lbs/A and trifluralin at 2 and 4 lbs/A appeared to reduce the numbers of broomrape strikes per plant. Metribuzin at 4 lbs/A, perfluidone at 8 lbs/A and napropamide at 8 lbs/A did not control broomrape, when compared to the check. Perfluidone displayed the most phytotoxicity to tomatoes. Tomato vigor was reduced by chloramben and trifluralin at 4 lbs/A. Vigor was slightly less than the check with trifluralin at 2 lbs/A and pebulate at 8 lbs/A. Tomatoes treated with metribuzin and napropamide were as vigorous as the checks. (Cooperative Extension, University of California, Parlier, CA 93648).

Table 1 The effect of six herbicides on tomato vigor

Herbicides	lb/A	Average number surviving tomatoes	Average[1/] tomato vigor
trifluralin	2	4.2	7.5
trifluralin	4	4.0	5.2
napropamide	8	4.5	8.8
perfluidone	8	4.0	6.2
pebulate	8	4.8	6.5
chloramben	8	3.5	4.0
metribuzin	4	5.0	7.5
check	-	5.2	8.5

[1/]Average of four replications. Based on 0 to 10 scale where 0 = no effect and 10 = most vigorous tomatoes. Applied 6/24/76. Evaluated 7/29/76.

Table 2 The effect of incorporated herbicides on the vigor of processing tomatoes and the number of broomrape strikes per plant

		Average[1/]	
Herbicides	lb/A	Tomato vigor	No. of strikes/Plant
trifluralin	2	5.5	0.6
trifluralin	4	4.2	0.6
napropamide	8	7.5	3.8
perfluidone	8	2.5	2.6
pebulate	8	5.1	0.6
chloramben	8	4.0	0.2
metribuzin	4	6.6	1.6
check	-	6.8	1.7

[1/]Average of 16 single plant replications (four plot replications). Transplanted 6/28/76. Treated 6/25/76. Evaluated 9/3/76.

Screening new herbicides for broomrape control in tomato. Lange, A. and R. Goertzen. A preplant incorporated herbicide screening trial was conducted for broomrape control on a Bowers clay loam in Santa Clara County. Plot size was 5 inches by 20 ft with a 5 ft buffer at the end of each plot. Chemicals were sprayed on with a CO_2 backpack and tilled in 5 inches.

The least number of broomrape was obtained with R-37878 at 4 lbs and MV-687 at 16 lbs/A. Interestingly enough, the least phytotoxicity was obtained with R-37878 at 4 lbs/A and MV-687 at 4 lbs/A.

Further work with R-37878 should be done at rates between 4 and 16 lbs/A, as broomrape counts and vigor reduction were low with this chemical. MV-687 also showed some control, however, tomato vigor was slightly more affected.

Even though related to trifluralin, phenoxalin showed no control of broomrape and showed slightly reduced tomato vigor. Perfluidone did not affect broomrape, but did reduce tomato vigor, perhaps even more so upon the addition of Tween 20. (University of California, Cooperative Extension, Parlier, CA 93648).

Preplant incorporated herbicide screening for broomrape control

Herbicides	lb/A	Total[1/] broomrape	Average[2/] vigor
MV-687	4	15 a	9.3
perfluidone	4	11 b	5.6
check	-	11 b	9.3
perfluidone + TW 20	4+1	10 bc	4.3
penoxalin	4	9 bcd	8.3
R-37878	4	7 cd	9.3
MV-687	16	7 cd	7.3
R-37878	16	1 e	6.6

[1/] Total of three replications. Treated 4/28/76. Evaluated 8/27/76.
[2/] Average of three replications. Based on 0 to 10 scale where 0 = no effect and 10 = most vigorous. Treated 4/28/76. Evaluated 8/27/76.

Dinitramine-metribuzin combinations for potato weed control. Callihan, R.H. Postplant preemergence treatments of dinitramine and metribuzin at rates of 0.0, 1/3, 3/8, and 1/3 lb/A in factorial combination were tested on commercially grown potatoes on silt loam soil in 1976. Dinitramine treatments were applied by tractor sprayer after potatoes were hilled and were incorporated by two Lilliston cultivations. After incorporations, metribuzin treatments were applied by tractor sprayer and incorporated with 1.5 inches of sprinkler irrigation water within four days.

The uniform dense stand of lambsquarter, pigweed, mustards, and annual grasses provided a very high pressure weed test.

Excellent weed control resulted from dinitramine-metribuzin combinations at all rates used; control from the 0.25 + 0.25 lb combination was as good as control from higher rates. Dinitramine without metribuzin gave 90 to 94% or better control of pigweed and lambsquarter. Control of wild oats and setaria by dinitramine was more dose-dependent, ranging from 80% control at 0.25 lb/A to 94% control at 0.50 lb dinitramine. Control of mustards by dinitramine was also dose-dependent, ranging linearly from 44% control at 0.25 lb to 80% control at 0.50 lb dinitramine. Metribuzin gave complete control of pigweed, lambsquarter, and mustard at all rates used, but grass control was slightly erratic ranging from 95% up.

Potato tolerance to dinitramine was excellent in these conditions when yield, rate, or specific gravity were the criteria. Total yield or yield of any grade component were negatively influenced only by treatments that permitted weed survival and were consequently associated with weed competition. Plant height was not reduced by any dinitramine treatment. There was some suggestion of stunting by the 0.50 lb rate of metribuzin, but this did not appear to be significantly reflected in yield or quality components. Dinitramine alone at any rates used did not provide complete control of lambsquarter, wild oats, foxtail or mustards, while metribuzin alone completely controlled all except the grass species. (University of Idaho Research & Extension Center, Aberdeen 83210).

Potato crop and weed response

Rates, lb/A		% Biomass[1]				Potato height[2]	Specific gravity[3]	Total yield[4]
dinitramine	metribuzin	lambsquarter	redroot	mustard	grasses			
0.0	0.0	100	100	100	100	42	78	52
0.0	0.25	0	0	0	2	40	77	91
0.0	0.38	0	0	0	0	40	77	92
0.0	0.50	1	0	0	0	39	77	90
0.25	0.0	6	10	58	20	40	77	68
0.25	0.25	0	0	0	0	39	76	88
0.25	0.38	0	0	0	0	38	77	90
0.25	0.50	0	0	0	5	38	76	88
0.38	0.0	0	8	34	10	40	77	69
0.38	0.25	0	0	0	0	40	77	88
0.38	0.38	0	0	0	0	40	76	94
0.38	0.50	0	0	0	0	36	78	85
0.50	0.0	8	8	20	6	40	78	68
0.50	0.25	0	0	0	1	38	78	80
0.50	0.38	0	0	0	0	36	77	90
0.50	0.50	0	0	0	1	36	77	85

1/ Expressed as % of check. 0 = no weeds, 100 = no control
2/ Height in cm 7-12-76
3/ Expressed as (specific gravity -1) x 100
4/ Lb/plot

Effect of FMC 25213 for potato weed control. Callihan, R.H. Results for two previous years showed FMC 25213 to be highly effective as a potato herbicide in controlling a wide range of annual weeds without rotation carryover in grain and without potato crop injury, at doses well above those required for weed control. Recrop studies from a third year showed serious carryover damage to barley from all rates used. The product was apparently not too phytotoxic to potatoes for foliar or postemergence application and satisfactorily incorporated by overhead irrigation. No overt symptoms were noticed on potatoes treated with 3 lb/A active ingredient or less in previous years. This herbicide appears well suited for application after cultivation or layby and possibly as a sprinkler injected application.

Potatoes produced in field conditions were treated in 1976 with a range of FMC 25213 rates on three dates at a range of growth stages. Standard fertilizer, insecticide, fungicide, and irrigation were managed in accordance with conventional practice. Observations were as follows: FMC 25213 exerted considerable inhibition and control of emerged seedlings of all annual weeds observed, but provided consistent excellent control only when applied prior to emergence of such weeds. Pigweed and lambsquarter were highly sensitive to rates as low as 1 lb/A. Brassicas, nightshade, and alfalfa seedlings were less sensitive, requiring 3 lb/A for acceptable control. Foxtail and wild oats were highly sensitive to rates as low as 1 lb/A. Early season overall control of all species was acceptable at 3 lb/A or above. Late season weed control showed that early season weeds that had been inhibited continued to remain stunted and succumbed to potato competition, resulting in excellent weed control from 2 lb/A or more applied either pre or early postemergence to the weeds. Treatment preemergence to weeds was consistently better than postemergence applications. This seasonal progression of weed suppression shows the importance of late season observations.

Potato vine inhibition was discernible consistently at 3 lb/A and above in preemergence treatments. In early postemergence plots, stunting at 3 lb/A was barely discernible. In late postemergence treatments, no detectable stunting was noticed in any plots. Observations after the first weed in July continued to show no effect on most plants.

Harvest results showed that FMC 25213 can result in lower percent of US #1. This was a significant factor when the herbicide was applied preemergence to potatoes. When applied after potato emergence, the malformation tendence was not as pronounced. The total percent malformed tubers was low where weed control was poor, so the malformation data must be interpreted with the competition effect in mind lest the apparent effect of the herbicide be mistaken. In the Russet Burbank variety, normally at least 10% of the total yield consists of malformed tubers. Malformations at rates of 3.0 or more lbs/A FMC 25213 applied preemergence were significant, but meaningful changes due to postemergence applications only as a result of excessive rates of FMC 25213. No increase in small (less than 4 oz) tuber percentages was noted as a result of effective herbicide rates. No change in average tuber size resulted from the direct effect of FMC 25213 at rates of 3.0 lb/A or less. Tuber size as well as percent malformed tubers in untreated plots were generally smaller due to weed competition.

FMC 25213 was an effective herbicide for potato weed control in this test. It provided excellent control at rates of 2 lb/A and over if applied prior to weed emergence. Weeds treated with this rate in the cotyledon or small plant stage were not competitive. Potatoes were tolerant to 2 lb/A if the herbicide was applied after the plants had attained 3 to 5 inches in height, and tolerance appeared to increase with potato growth. It appears that FMC 25213 would be best applied to potatoes that have emerged, have attained the height of 4 or more inches, and have been recently cultivated. Since FMC 25213 is a root inhibitor, such plants having well developed root systems are not seriously affected. Earlier applications would be effective but would reduce yield and quality. Further studies should include a monitoring of morphogenic effects, but it appears that excellent weed control without adverse effects would be possible with this herbicide. Consistent carryover injury to 1976 wheat from 1975 applications of 3 lb/A. The soil had been disked only prior to planting. This problem would need to be overcome before commercial usage would be feasible. (University of Idaho, Research and Extension Center, Aberdeen, ID 83210).

Weed response to FMC 25213[1/]

Lb/A FMC 25213	Stage[2/]	Pig-weed	Mustard	Lambs-quarter	Hairy night-shade	Alfalfa seedlings	setaria	Wild oats	Overall late season weeds[3/]	Overall weed biomass
0	1	100	100	100	100	62	100	100	98	100
1	1	0	9	1	11	11	0	1	5	7
2	1	0	5	0	8	4	1	1	0	4
3	1	0	2	0	2	0	0	0	1	1
6	1	0	1	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0
0	2	100	100	100	100	60	100	100	99	100
1	2	28	30	16	28	5	18	14	19	27
2	2	9	25	2	16	5	2	1	2	19
3	2	5	9	0	4	12	1	0	1	6
6	2	4	6	0	2	9	1	0	1	4
12	2	1	2	0	0	2	0	0	1	2
0	3	100	100	100	100	100	100	100	99	100
1	3	100	98	100	100	55	100	100	90	99
2	3	98	98	100	100	65	100	100	95	98
3	3	100	96	100	100	55	90	100	90	98
6	3	90	88	91	95	32	100	100	86	89
12	3									

1/ Weed response July 7, expressed as % of best check plots. 0 = 100% control, 100 = no weed control or symptoms.

2/ Stage 1 = preemergence to potatoes and weeds. Stage 2 = potatoes 3 to 5 inches high and weeds in cotyledonary stage. Stage 3 = potatoes at laby stage, weeds 6 inches high.

3/ September 5 evaluation.

PROJECT 5

AGRONOMIC CROPS

Donald R. Colbert, Project Chairman

SUMMARY -

A total of 54 papers covering ten agronomic crops were submitted. The papers have been arranged and are briefly summarized by crop. Late reports are not included in the summary.

Alfalfa - Trials on established alfalfa in Wyoming showed that good weed control and crop tolerance were obtained from the following herbicide treatments: pronamide, napronamide, FMC 25213, metribuzin, simazine, secbumeton, terbacil, and VEL-5026. Injury was noted from VEL-5026 when 2 lb/A or more was used.

In California, several herbicides gave more effective weed control when applied in mid December than in mid February.

Research in Utah showed that DCPA, chlorpropham, and 4 lb/A of butralin gave good dodder control. Some early injury was noted from this high rate of butralin. Seedling alfalfa weed control was obtained from: benefin, profluralin, butralin, dinitramine, and EPTC. The latter two herbicides showed some crop injury.

Barley - In Wyoming, combinations of triallate (PPI) followed by a post-emergence application of either HOE 23408, difenzoquat, or barban were more effective in controlling wild oats than any herbicide applied alone. HOE 23408 wild oat activity was increased by the addition of Surf B-Trition X surfactant. A difenzoquat plus 2,4-D amine combination was less effective on wild oats than difenzoquat alone. However, a 2,4-D ester combination gave similar results as difenzoquat alone.

In another trial, a combination of metribuzin with either paraquat or glyphosate gave excellent weed control in a fallow system. Lenacil 2 lb/A and VEL-5026 at 2 and 4 lb/A stunted and reduced the barley stand the following crop year.

Field Beans - In California, for yellow nutsedge and hairy nightshade control the best treatments were metolachlor, alachlor, or combinations of alachlor with either: ethafluralain, dinitramine, trifluralin, fluchloralin, or penoxalin.

Sutter pinks, red kidneys, and small white bean tolerance trial showed that some injury to small whites and red kidneys occurred from 1.5 lb/A (PPI) of penoxalin. Ethafluralin at 1.0 lb/A showed slight chlorotic spotting on the red kidneys.

Corn - In several trials conducted in California and Wyoming the best PPI treatments for overall annual weed control and crop tolerance were: metolachlor, alachlor, butylate + R 25788, EPTC + R 25788, EPTC + R 29148, R 33222, and metolachlor + procyazine. Excellent yellow nutsedge control was obtained with metolachlor, alachlor, butylate + R 25788, and EPTC + R 25788.

An experiment in Wyoming showed that delayed incorporation of EPTC + R 25788 6.7E formulation appeared to have more influence on its weed control efficiency than a 3S formulation. In another trial, the best preemergence herbicide treatments applied through a center-pivot sprinkler were: alachlor + cyanazine, butylate + R 25788 + atrazine, atrazine, CGA 24705 + atrazine, and penoxalin + cyanazine. When applied preemergence under sprinkler irrigation, VEL 5026 and bifenox in combination with alachlor caused considerable crop injury.

A trial in Oregon showed that the addition of the insecticide fonofos at 2 lb/A to EPTC + R 25788 at 8 lb/A caused severe sweet corn injury. No injury was noted from the addition of fonofos with either vernolate + R 25788, or alachlor.

Cotton - Several trials in California showed that the herbicides H 26910, Dowco 295, and EL 171 warrant further testing for nutsedge control.

In Arizona, over-the-top applications of 8 oz/A or more of glyphosate caused wilted and stunted cotton plants for more than 10 weeks after treatment.

Peppermint - Postemergence Canada thistle experiments in Oregon showed that a single application or early split applications of bentazon gave less consistent control than split applications made from mid-May to late June. Mint hay yields were not reduced until application rates exceeded 4 lb/A. Postemergence applications of HOE 29152 looks promising for controlling perennial ryegrass and quackgrass in mint.

Red Clover - In Oregon, initial data indicated that red clover established by activated carbon seeding has excellent tolerance to 2.0 kg/ha of diuron.

Sorghum - PPI applications of R 37878, bifenox, and 6 lb/A propachlor gave excellent barnyardgrass control with good crop tolerance. Hercules 26910 at 2 lb/A showed some slight vigor and stand reduction to the sorghum. Preemergence applications of bifenox gave no control of barnyardgrass.

In another experiment, good barnyardgrass control with an acceptable stand and low crop phytotoxicity were found with preemergence applications of 8 lb/A of propachlor and R 37878. HOE 23408 and VEL 5052 gave good barnyardgrass control but resulted in crop injury.

Sugarbeets - In Arizona, for season long weed control the best treatment was a PPI application of ethofumesate followed by postemergence application of phenmedipham and pronamide.

An experiment in Wyoming showed that the best treatments for weed control and crop tolerance were: (a) PPI application of H 22234 + ethofumesate followed by a postemergence application of either phenmedipham or desmedipham, and (b) PPI application of H 22234 + pyrazon followed by phenmedipham or desmedipham postemergence.

In Colorado, for overall weed control, a PPI application of ethofumesate alone or in combination with cycloate, HOE 23408, endothall 283, H 22234, or pyrazon were the best treatments. An EC formulation of ethofumesate gave similar weed control activity as the flowable formulation with better beet tolerance.

In California, postemergence applications of HOE 23408 (2 lb/A) gave effective control of young barnyardgrass. Tank-mixing with desmedipham reduced HOE 23408 activity on barnyardgrass. By applying desmedipham one week after the HOE 23408 application, both herbicides performed quite well.

Wheat - The following chemicals show promise in controlling downy brome: terbutyn, procyazine, metribuzin, propham, LS-69-1299, cyanazine, HOE 23408, and VEL 5026.

Rainfall improved HOE 23408 efficacy on young wild oats when applied 3 to 12 hrs before rain. Rain occurring up to 24 hrs after difenzoquat treatments caused a significant reduction in efficacy. In another experiment, several digenzoquat combinations and HOE 23408 treatments were very effective in reducing wild oat seed production. HOE 23408 and barban tank-mix combinations with 2,4-D ester were less effective in controlling wild oats than when either was applied alone. Tank-mix combinations of difenzoquat with bromoxynil or 2,4-D ester were quite effective in controlling wild oats.

In Oregon, HOE 23408 and combinations of triallate with either barban or diuron gave excellent annual ryegrass control.

An experiment in California showed that nitrofen, HOE 23408, and metribuzin were effective in controlling canarygrass.

In Utah, a combination of tillage and glyphosate looks good for controlling quackgrass in wheat.

PAPERS -

Weed control in dormant dryland alfalfa-spring treatments. Alley, H.P., G.L. Costel and N.E. Humburg. The herbicides listed in the table were applied to a heavily infested, low producing dryland alfalfa field on 3/23/76. The downy brome was in the one to three leaf stage of growth, approximately 1/2 to 1 inch leaf height and the field pepperweed was in the early cotyledon stage at time of herbicide application.

The soil was classified as a sandy loam with a pH of 7.1, 3.5% organic matter, 69% sand, 16% silt, and 15% clay.

All herbicides were applied with a three-nozzle knapsack spraying unit in a total volume of 40 gpa water. Plots were 9 ft wide by 30 ft in length and were arranged in a randomized complete block experimental design with three replications. Alfalfa yield determinations, where weed control was apparent, were made by mowing the treated plots, oven-drying and calculating production of alfalfa produced per acre.

Metribuzin and VEL-5026, at all rates of application, gave 100% control of downy brome and field pepperweed. Simazine gave 99% and 90% control, respectively, of field pepperweed and downy brome. Propham (Chem Hoe-135) gave 100% control of the downy brome but exhibited no activity toward the broadleaf weeds. Pronamide did not perform anywhere near its capability; possibly due to its insolubility and limited precipitation between time of treatment and evaluation.

Pure alfalfa production, was in most cases, more than doubled on treated plots as compared to non-treated plots. A comparison of mowing versus hand clipping the untreated plots did now show as great a difference in alfalfa yield obtained as the difference in downy brome yield. Almost twice as much downy brome was harvested from the hand clipped as compared to mowing. The difference can be attributed to the difficulty encountered in mowing mature downy brome. (Wyoming Agric. Exp. Sta., Laramie SR 751).

Weed control and alfalfa production year of treatment (1976) [1/] Sheridan Agricultural Substation

Herbicide	Rate lb/A	Percent control: Field pepperweed	Percent control: Downy brome	Alfalfa: ovendry lb/A	Alfalfa: Observation
metribuzin	0.5	100	100	1879	Excellent treatment
metribuzin	1	100	100	2378	Excellent treatment Healthy alfalfa
proamide	0.5	0	20	--	Very little activity
proamide	1	0	55	--	Some activity on grass
proamide	1.5	0	80	990	Activity on grass
R-33222	1	0	0	--	No activity
R-33222	2	0	0	--	No activity
propham	3	0	100	1794	Excellent grass control
USB-3153	0.33	0	0	--	No activity
USB-3153	0.5	0	0	--	No activity
USB-3153	0.66	0	0	--	No activity
simazine	1.2	99	90	2175	Excellent treatment Healthy alfalfa
VEL-5026	0.75	100	100	2249	No phyto to alfalfa
VEL-5026	1	100	100	2083	No phyto to alfalfa
VEL-5026	1.5	100	100	2416	No phyto to alfalfa
VEL-5026	2	100	100	1659	Burned alfalfa
VEL-5026	4	100	100	1479	Burned alfalfa Hurt the stand
Check (Mowed)	--	--	--	950	Downybrome--436 lb
Check (Clipped)	--	--	--	1122	Downybrome--888 lb

1/ Treated 3/23/76; evaluated and harvested 6/10/76.

Longevity of downy brome control in alfalfa resulting from pronamide alone and in combination with other herbicides. Alley, H.P., G.L. Costel and N.E. Humburg. This study was established on a heavily weed-infested low productive dryland alfalfa field on 4/5/73 at the Sheridan Agricultural Substation. The weed complex consisted primarily of downy brome with lesser populations of tansy mustard, blue mustard, field pepperweed, and meadow salsify. Downy brome was 0.75 to 1.0 inch tall, tansy mustard 0.5 inch rosette, blue mustard 1 inch growth, 3 to 4 leaf, and field pepperweed 0.5 inch growth at time of herbicide treatment. Alfalfa showed some green growth near the crown of the plant. The soil was classified as a sandy loam with a pH of 7.1, 3.5% organic matter, 69% sand, 16% silt, and 15% clay.

All herbicides were applied with a three-nozzle knapsack sprayer in a total volume of 40 gpa water. Treatments were 1 sq rd in size with a randomized complete block experimental design with three replications.

Weed control determinations were made by clipping and separating the alfalfa and weeds in 1973, with visual determinations made in 1974, 1975, and 1976. Alfalfa production was determined by harvesting a 2.5 ft diameter quadrat in each replicated plot, oven-drying and weighing for yields.

Weed control data accumulated over a four-year period showed that napronamide and pronamide were very effective downy brome herbicides, but weak on annual broadleaf weeds, whereas, terbacil showed good activity on both annual grass and broadleaf weeds infesting the plot areas.

Downy brome control resulting from napronamide and napronamide + pronamide increased the year following treatment and has maintained a high level of control for a period of four growing seasons. Napronamide + terbacil has maintained 90% control or better for four years at the high rate of application with the lower rate resulting in only a 50% reduction the fourth year. Effective downy brome control could be expected for at least four years under climatic and soil conditions similar to the experimental site of this test with the two high rates of napronamide, the high rate of napronamide + terbacil, and combinations of napronamide + pronamide. (Wyoming Agric. Exp. Sta., Laramie SR 753).

Weed control and alfalfa production from herbicide treated plots (Sheridan Agricultural Substation)

Treatment[1/]	Rate lb/A	Alfalfa lb oven-dry/A[2/] 1973	1975	Percent control Downy brome 1973	1974	1975	1976
napronamide	2	1667	3712	48	70	60	20
napronamide	4	2020	3542	79	98	90	90
napronamide	6	1973	3910	74	98	95	95
napronamide +	2						
terbacil	0.5	2533	3542	98	90	98	50
napronamide +	4						
terbacil	0.5	2720	4398	99	99	98	90
napronamide +	2						
pronamide	1	2007	3054	77	99	98	80
napronamide +	4						
pronamide	1	2147	3665	81	99	100	95
Check		1320	3317	0	0	0	0

1/ Treatments applied 4/5/73.

2/ Clippings made 6/20/73 and 6/24/76.

<u>Downy brome control in semi-dormant dryland-alfalfa one year following treatment</u>. Alley, H.P., G.L. Costel and N.E. Humburg. The herbicides listed in the table were applied to a heavily weed-infested, low productive dryland alfalfa field on 4/22/75 at the Sheridan Agricultural Substation. The soil was classified as a sandy loam with a pH of 7.1, 3.5% organic matter, 69% sand, 16% silt, and 15% clay. Soil temperature at time of treatment was 41 F at 1.0 inch, 44 F at 2-1/4 inches, and 44 F at the 4-1/2 inch soil depth.

The weed species consisted primarily of downy brome and field pepperweed, with a minor population of tansy mustard and meadow salsify. The alfalfa had started to grow with approximately 2-1/2 inches of green growth; the downy brome 1-1/2 to 2 leaf and 1.0 inch tall, and the mustards in the 6-leaf stage at time of treatment.

All herbicides were applied with a three-nozzle knapsack spray unit in a total volume of 40 gpa water. The plots were 9 ft by 30 ft, randomized with three replications. Alfalfa yield determinations were made by clipping those plots showing good activity toward downy brome control, oven-drying and calculating production per acre.

Fourteen months after treatment, twelve of the treatments maintained 80% or greater downy brome control with seven treatments maintaining better than 90% downy brome control. Percent control ratings indicate that napronamide + EPTC at 4 + 3 lb/A, napronamide at 4 lb/A, and FMC-25213 at 2 & 3 lb/A, were more effective one year following treatment than the year of treatment. Secbumetone was the only treatment resulting in effective control of both the broadleaf and grass spectrum.

All treated plots harvested, outyielded the untreated plots. The increased alfalfa production ranged from a high of 1993 lb/A oven-dry alfalfa from plots treated with secbumetone at 1.2 lb/A to a low of 1099 lb/A from plots treated with pronamide at 0.75 lb/A. The untreated plots yielded 600 lb/A oven-dry alfalfa. (Wyoming Agric. Exp. Sta. Laramie, SR 752).

Weed control and alfalfa production one year following treatment

Herbicides[1/]	Rate lb/A	Percent control: Broadleaf	Percent control: Downy brome 1975	Percent control: Downy brome 1976	Alfalfa lb/A oven-dry
napronamide 2E +	2				
EPTC 3S	2	0	0	0	----
napronamide 2E +	4				
EPTC 3S	3	25	0	85	1611
napronamide 2E	2	10	30	40	----
napronamide 2E	4	24	50	90	1662
bifenox	1	20	30	0	----
FMC-25213	2	30	60	90	1586
FMC-25213	3	10	70	93	1220
fluchloralin + cittowet	0.75	0	30	10	----
fluchloralin + cittowet	1.5	0	30	10	----
fluchloralin	0.75	0	20	10	----
fluchloralin	1.5	6	30	10	----
VEL-5026	0.25	0	30	10	----
VEL-5026	0.5	0	50	80	1135
VEL-5026	1.0	0	100	80	1252
VEL-5026	2.0	0	100	90	1174
metribuzin	0.5	0	100	80	1166
metribuzin	1.0	0	100	86	1443
simazine	1.2	25	85	76	1600
secbumetone	1.2	93	95	97	1993
terbacil	0.8	0	100	78	1453
diuron +	2.0				
terbacil	0.5	10	100	75	1429
pronamide	0.75	0	90	95	1099
pronamide	1	0	98	96	1571
Check			--	--	600

1/ Treated 4/22/75; evaluated 6/24/75 and 6/10/76.

Evaluation of light rates of pronamide for annual weed control in dormant alfalfa. Alley, H.P. and N.E. Humburg. Three, light rates of pronamide was applied to dormant alfalfa 10/6/75 at the Sheridan Agricultural Substation. No alfalfa or winter annual weeds were growing at the time of treatment because of exceedingly dry fall conditions. The soil at the experimental site was classified as sandy loam (69% sand, 16% silt, 15% clay with 3.5% organic matter and 7.1 pH).

The weed population consisted of downy brome and field pepperweed. All herbicides were applied with a three-nozzle knapsack sprayer unit in 40 gpa water.

Weed control evaluations were by visual evaluations and the three replicated plots were harvested to determine alfalfa yields, which are reported in lb/A oven-dry.

All rates of pronamide gave 100% control of the downy brome eight months following treatment. No broadleaf weed control was obtained with the two low rates of application and only a 50% reduction at the highest rate (0.5 lb/A). (Wyoming Agric. Exp. Sta., Laramie SR 754).

Weed control and alfalfa production resulting from light rates of pronamide - Sheridan Agricultural Substation

Herbicide 1/	Rate lb/A	Percent control: Field pepperweed	Percent control: Downy brome	Alfalfa lb/A oven-dry	Observations
pronamide	0.25	0	100	2636	Very little activity on any broad-leaved weeds in treated plots
pronamide	0.375	0	100	2439	
pronamide	0.5	50	100	2529	
Check		--	--	950	

1/ Treated 10/6/75; evaluated and harvested 6/10/76.

Evaluation of preemergence herbicides to control western field dodder in alfalfa seed fields. Evans, J.O. Western field dodder is a serious threat to alfalfa seed production in Utah. It is probably the most common weed occurring in seed fields and responds poorly to normal control practices. An evaluation was made to compare six herbicides for dodder control and alfalfa crop safety. Only butralin at 4 lb/A produced observable injury to the crop and this injury was only temporary but did exist during the first 45 days after the crop broke dormancy. Dodder control at this dosage of butralin was very good in this trial. Two compounds appeared to excel in dodder control at all dosages tested. DCPA controlled field dodder satisfactorily at either 8 or 12 lb/A. Sufficient residual action of the herbicide remained to control dodder throughout the season. Chlorpropham provided acceptable dodder control at both rates evaluated. Pronamide and trifluralin plus NTN 6867 were weak on dodder; these materials appeared to lack sufficient moisture to be active on the weed. Similarly, the lower dosages of butralin did not provide acceptable dodder control. (Utah Agricultural Experiment Station, Logan, UT 84321).

Evaluation of preemergence herbicides for controlling western field dodder in alfalfa seed fields - 1976

Treatment	Rate lb/A	Crop response	Weed response lbs/2m[2]	% control
pronamide	1	0	48	0
pronamide	2	0	34	2
pronamide	4	0	36	0
DCPA	8	0	4	95
DCPA	12	0	0	100
chlorpropham	4	0	9	85
chlorpropham	6	0	14	75
trifluralin +	0.5			
BAY-NTN-6867	3	0	19	50
butralin	1	0	14	70
butralin	2	0	21	50
butralin	4	0.3	3	96
control	-	0	44	--

Treated - 3/26/76

Evaluated - 7/15/76

Plot size - 20 by 50 feet

Counts made by 3 separate 2 sq m quadrats

Bicycle sprayer or cyclone seeder application - 20 gpa water with 8003 nozzles at 30 psi

Annual weed control in seedling alfalfa. Evans, J.O. Several herbicides are currently being evaluated which show good to excellent control of most annual weeds in new alfalfa plantings. In 1976 several of the materials were compared for broad-spectrum control of grasses and broadleaved weeds in new hay. A new formulation of EPTC provided excellent control of redroot pigweed, lambsquarter, and green foxtail at 3 lb/A. It also provided excellent control at 4 lb/A but some injury in the form of leaf curling was observed. The curled plants quickly recovered and 22 days after crop emergence no evidence of herbicide injury appeared on new plant foliage in any of the four replications. Likewise this treatment could not be visually recognized as causing injury when the plots were evaluated just prior to first cutting. The safener in EPTC did not protect the seedling alfalfa plants when compared with an equivalent rate of EPTC alone. Slight injury was observed when the safener was added to 3 lb/A EPTC; weed control in these plots was very good.

Dinitramine at 0.5 lb/A is an excellent weed control material but it resulted in slight injury to the new hay in this trial. Previous testing has not revealed similar injury to that observed in 1976. Benefin, profluralin and butralin were nearly identical in performance on both broadleaved and grassy weeds, all three provided commercially acceptable control. HOE 23408 is most promising for grass control but suffers in that its control of broadleaved weeds is poor. Other trials have shown this to be an effective grass herbicide when applied as a postemergence treatment. (Utah Agricultural Experiment Station, Logan, UT 84321).

Annual weed control in seedling alfalfa

Treatment	Rate lb/A	Alfalfa injury	Weed control (%)		
			Pigweed	Lambsquarter	Foxtail
EPTC (7EC)	3	0.5	94	100	90
EPTC (7EC)	4	2.0	100	97	100
EPTC + R-25788	3	0.3	87	96	93
benefin	3	0	93	96	87
profluralin	1	0	87	97	84
dinitramine	0.5	2.0	96	100	94
butralin	1	0	83	89	81
butralin	2	0	89	97	91
HOE 23408	4	0	21	17	100
Control	-	0	0	0	0

Planting date - 5/4/76
Incorporation and treatment date - Flex-time harrow 1 1/2 inches deep on 5/4/76
Plot size - 12 by 30 feet with 4 replications
Bicycle sprayer - 8003 nozzles at 30 psi and 20 gpa water
Evaluations made - 5/27/76 and 6/18/76
Variety - Ranger

Timing of postemergence herbicide applications for winter weed control in semi-dormant alfalfa. Norris, R.F., R.A. Lardelli, and C.A. Schoner, Jr. This trial was designed with the intention of better elucidating some of the problems associated with winter annual weed control, especially time of application, in alfalfa.

The herbicides listed in the table were applied to a heavily weed infested field of 'Lahonton' alfalfa near Davis. Split plots were used for two application dates; the first application was on December 15, 1975 and the second application was February 10, 1976. All herbicides, except oil plus dinoseb, were applied in 40 gal/A of water with a five nozzle, 8 ft wide, boom CO_2 backpack sprayer. The plots were 8 ft wide by 33 ft long and were replicated four times. The weed species complex consisted primarily of annual bluegrass and groundsel, with lesser amounts of shepherds purse. Due to cool weather and low soil moisture no change in weed size occurred between the two application dates; the growth remained at about 1.0 to 2.0 inches tall. The alfalfa showed a small amount of new growth near the crowns.

Weed control and crop vigor were evaluated visually. The best winter weed control was obtained, almost universally, when the treatments were applied early in the winter treating period. Grass control was excellent for many early treatments; diuron alone, dinoseb plus X-77 and weed oil plus dinoseb were exceptions. All treatments, except paraquat, were much less effective when applied late. The same type of results also occurred in relation to control of the broadleaved weeds, although the loss of activity was not as great as occurred with annual bluegrass. Paraquat plus X-77 was the only treatment capable of providing good weed control when applied late, but it should be noted that the alfalfa was also damaged and recovery was delayed. The treatments of chlorpropham plus dinoseb, pronamide plus dinoseb, and terbacil at 0.75 lb/A provided excellent weed control and crop selectivity in this test, but do require early treatment to be fully effective. (Botany Department, University of California, Davis, CA 95616 and Cooperative Extension, Woodland, CA).

Mixed winter annual weed control in established alfalfa (Yolo County)

Treatment	Rate lb/A	Date treated	Alfalfa vigor 3/11	Weed Control: Annual bluegrass 2/19	Annual bluegrass 3/11	Broadleaved weeds 2/19	Broadleaved weeds 3/11
diuron	2.4	A	9.0	6.4	7.1	0.8	4.0
		B	8.5		0.9		1.3
diuron + dinoseb	2.4 + 1.75	A	9.2	8.4	9.5	8.4	9.4
+ 0.5% X-77		B	9.1		1.5		3.0
dinoseb	1.75	A	9.9	4.4	3.9	9.0	8.6
+ 0.5% X-77		B	9.1		0.6		3.5
pronamide	1.5 + 1.75	A	9.5	9.4	10.0	9.5	8.8
+ dinoseb + 0.5% X77		B	9.3		2.4		5.3
chlorpropham + dinoseb	3.0 + 1.75	A	9.2	8.0	7.6	9.9	8.6
+ 0.5% X-77		B	9.2		2.6		6.6
chlorpropham + PPG-124	3.0 + 1.75	A	9.0	8.8	9.6	9.9	8.8
+ dinoseb + 0.5% X-77		B	8.9		3.9		9.2
weed oil/dinoseb	1/	A	9.7	7.6	5.1	8.2	5.9
		B	9.8		4.8		8.0
paraquat	0.66	A	9.4	10.0	9.8	10.0	8.9
+ 0.5% X-77		B	7.5		9.1		9.0
paraquat	1.0	A	9.2	10.0	9.9	10.0	8.6
+ 0.5% X-77		B	6.9		9.6		8.8
metribuzin	0.5	A	8.9	9.8	9.8	1.3	3.5
		B	8.9		3.1		3.0
metribuzin	1.0	A	9.4	10.0	10.0	2.3	5.0
		B	9.2		5.0		3.5
metribuzin	2.0	A	9.3	10.0	10.0	3.0	7.2
		B	9.5		4.5		3.9
terbacil	0.75	A	8.9	9.7	10.0	7.5	9.9
		B	9.1		4.0		3.0
terbacil	1.0	A	9.1	9.5	10.0	9.2	9.8
		B	9.0		1.9		2.9
terbacil	1.5	A	8.9	9.8	10.0	9.3	9.4
		B	9.0		4.1		3.0
Untreated Check		A	9.5	0	0.3	0	0.5
		B	9.5		0		0

All data are means of 4 replications.
All dinoseb treatments were using the non-selective formulation.
Vigor: 0 = all dead, 10 = full vigor; control 0 = none, 10 = complete control.
1/ Weed oil plus dinoseb; 50 gal weed oil, 1.75 lb/A dinoseb plus 30 gal water/A.
A = December 15, 1975 B = February 10, 1976

Postemergence control of yellow foxtail in established alfalfa. Smith, N.L., C. Wilson, and B. Richardson. Trials were conducted to test the effectiveness of asulam, HOE 23408, pronamide and oryzalin for postemergence control of yellow foxtail in established alfalfa.

Applications were made June 4, 1976 following the third cutting of an alfalfa field heavily infested with yellow foxtail in Sutter County, California. Yellow foxtail varied in growth from seedlings to flowering plants. Treatments consisted of asulam at 0.5, 1, 2, and 4 lbs/A and HOE 23408, pronamide and oryzalin each at 1 and 2 lbs/A. Granular formulations of pronamide and oryzalin were applied with a Whirlybird spreader. Asulam and HOE 23408 were applied with a CO_2 hand sprayer using a spray volume of 40 gpa. Ten by twenty ft plots were replicated four times. The plot area was flood irrigated within 24 hours after the herbicide applications were made.

An initial evaluation was made July 6 following the fourth cutting. At this time, only asulam exhibited any degree of control. It was also observed that numerous yellow foxtail seedlings had emerged. Each asulam plot was divided in half and retreated with the original rates at this date.

Adjacent to the original trial a second test was initiated July 6 using only asulam. Application technique was identical to the original test. All plants were harvested from an area of 12 sq ft. Evaluations were made July 13 and August 10 in each plot and hand separated into alfalfa and yellow foxtail. This was dried to 0 percent moisture and yields were determined (table 1).

A third trial was initiated August 24 near Red Bluff, California. Treatments consisted of asulam, asulam + X-77 and glyphosate. Alfalfa had 4 to 8 inches of new growth following cutting and yellow foxtail was primarily headed. Evaluations were made September 8, September 22, and October 12. Results are shown in table 2.

Asulam gave acceptable control of emerged yellow foxtail, however repeat applications may be necessary for season long control due to its long germination period. The addition of surfactant gave no additional activity. Some degree of phytotoxicity was observed, particularly at the higher rates, however the alfalfa rapidly recovered. Yellow foxtail yield was reduced dramatically from properly timed applications of asulam at the 1, 2 and 4 lb/A level. Glyphosate gave excellent yellow foxtail control but alfalfa injury was severe. None of the other herbicides tested gave acceptable results. (University of California Cooperative Extension, Davis, Sutter and Tehama Counties, California).

Table 1 Postemergence control of yellow foxtail in established alfalfa (Sutter Co)

Herbicide	Initial application date	lb/A	Yellow foxtail control 1/ 7/6/76	7/13/76	8/10/76	Phyto-toxicity 2/ 7/13/76	Yield lb/A at 0% moisture 8/10/76 Alfalfa	Yellow foxtail
asulam	6/4/76	0.5 + 0.5	-	7.0	7.3	1.5	957	133
asulam	"	0.5	6.5	5.3	2.8	0	1296	263
asulam	"	1.0 + 1.0	-	9.0	9.4	1.3	1356	27
asulam	"	1.0	8.6	8.0	5.3	0	1220	111
asulam	"	2.0 + 2.0	-	8.8	8.6	2.8	1174	68
asulam	"	2.0	8.0	7.0	3.0	0	1323	244
asulam	"	4.0 + 4.0	-	9.0	8.8	1.8	1305	37
asulam	"	4.0	8.8	7.3	4.0	0	1092	201
HOE 23408	"	1.0	4.1	1.5	1.9	0	874	434
HOE 23408	"	2.0	4.4	3.0	1.8	0	1193	432
pronamide	"	1.0	1.0	0.3	0.5	0	1108	595
pronamide	"	2.0	0.5	0	0	0	771	605
oryzalin	"	1.0	1.3	0.5	0.3	0	1062	487
oryzalin	"	2.0	2.5	1.6	1.5	1.0	1092	320
control	"	-	2.5	1.0	1.9	0	1053	291
asulam	7/6/76	0.5	-	-	3.5	1.0	1224	186
asulam	"	1.0	-	-	7.6	2.0	1212	96
asulam	"	2.0	-	-	8.3	2.3	1302	14
asulam	"	4.0	-	-	9.1	4.0	1288	18
control	"	-	-	-	0.4	0	1178	719

1/ Control: 0 = none, 10 = complete 2/ Phytotoxicity: 0 = none, 10 = dead

Table 2 Postemergence control of yellow foxtail in established alfalfa (Red Bluff)

Herbicide	lb/A	Yellow foxtail control 1/ 9/8/76	9/22/76	10/12/76	Phytotoxicity 2/ 9/8/76
asulam	0.5	0.3	2.3	7.8	0
asulam + X-77 3/	0.5	0.3	3.5	8.8	0
asulam	1.0	1.0	5.3	9.8	0.5
asulam	2.0	0.8	5.8	9.8	0
asulam	4.0	1.5	7.8	9.8	1.3
glyphosate	0.25	8.3	8.8	9.3	3.5
glyphosate	0.5	9.8	10.0	10.0	4.8
control	-	-	-	-	-

1/ Control: 0 = none, 10 = complete 2/ Phytotoxicity: 0 = none, 10 = all dead

3/ Surfactant X-77 at 0.5% v/v Average of 4 replications

Evaluation of single herbicide treatments for weed control in fallow systems and subsequent barley yields. Alley, H.P. and N.E. Humburg. The study was initiated 4/16/75 to evaluate the effectiveness of single herbicide treatments for weed control in a wheat-fallow system. The weed control obtained during the year of application is reported in the Res. Prog. Rept. of 1976, pages 160 to 161.

The plot area was seeded to winter wheat 9/3/75 but due to poor stand the area was reworked and spring barley (Otis) seeded 4/7/76. Plots were harvested 6/23/76 at which time notes on weed infestation and crop vigor were recorded and are presented in the following table.

One hundred percent weed control was obtained during the fallow year (1975) with VEL-5026 at 2 and 4 lb/A, and lenacil + WK at 2 lb/A. However, during the cropping season (1976) both of these chemicals stunted and/or reduced the stand of barley as evidenced in the barley yields. These two herbicides are outstanding weed control compounds, but at the rate which resulted in excellent weed control, the persistence and phytotoxicity to the barley was too severe. (Wyoming Agric. Exp. Sta., Laramie, SR-760).

Barley yield one year following herbicide combination treatments for weed control in fallow systems Archer Agricultural Substation

Herbicide 1/	Rate lb/A	Percent stand barley	Yield bu/A	Observations
VEL-5026	0.5	93	10.7	Reduction in stand due to plot location
VEL-5026	1	100	14.3	Uniform height, light blue color
VEL-5026	2	92	15.0	Barley stunted, blueish color
VEL-5026	4	27	6.3	Severe chemical damage, poor stand
procyazine	2	96	8.7	Barley stunted, blueish color, some weeds
lenacil + W.K. 2/	0.5	100	16.3	Some downy brome and lambsquarters
lenacil + W.K.	1	97	15.7	Some barley stunting
lenacil + W.K.	2	47	11.0	Barley stand reduced, chemical injury
cyanazine	1.6	100	10.0	Drought stress, stunted
cyanazine	2.4	100	10.0	Annual weed present
glyphosate	0.375	100	5.3	Severe drought stress
glyphosate	0.5	100	4.3	Severe drought stress
Check	-	-	4.7	Weedy, severe drought stress

1/ Treated 4/16/75

2/ Surfactant W.K. at 1/4% v/v

Evaluation of herbicide combinations for weed control in fallow systems and subsequent barley yields. Alley, H.P. and N.E. Humburg. The treatments were applied 4/16/75 and the weed control data obtained during the 1975 growing season was reported in the 1976 Res. Prog. Rept. pages 162 to 163.

The plot area was seeded with winter wheat 9/3/75 but due to poor stand the area was reworked and spring barley (Otis) seeded 4/7/76. Plots were harvested 6/23/76 at which time notes on weed infestation and crop vigor were recorded and are presented in the following table.

It is interesting to note that the two treatments which gave 100% control of the weed population during the 1975 growing season (metribuzin + paraquat and metribuzin + glyphosate) were also the two treatments which resulted in the highest barley yield and did not exhibit the drought stress and weed infestation common to the other treated areas. Barley growing on other plots exhibited drought stress, scattered infestations of downy brome and/or barley damage. The barley yields appear to indicate the percentage weed control obtained with the respective treatments during the fallow year and scattered infestations during the cropping season. (Wyoming Agric. Exp. Sta., Laramie, SR 759).

Barley yield one year following herbicide combination treatments for weed control in fallow systems
Archer Agricultural Substation

Herbicides	Rate lb/A	Barley % Stand	Barley Yield bu/A	Observations
cyanazine + atrazine + paraquat	1.5 + 0.75 0.5	100	14.3	Scattered downy brome
cyanazine + atrazine + paraquat	2.25 + 0.75 0.5	99	17.3	Scattered downy brome
cyanazine + atrazine + paraquat	2 + 1.0 0.5	96	15.0	Scattered downy brome, some chemical damage
cyanazine + atrazine	1.5 + 0.75	100	12.7	Scattered downy brome, barley stunted
cyanazine + atrazine	2.25 + 0.75	99	12.7	Scattered downy brome, barley stunted
cyanazine + atrazine	2 + 1.0	97	15.7	Scattered downy brome, barley stunted
procyazine + glyphosate	1 + 0.5	99	14.7	Light infestation of downy brome
procyazine + glophosate	2 + 0.5	100	14.0	Light infestation of downy brome
procyazine + atrazine + glyphosate	1 + 0.5 0.5	100	15.7	Light infestation of downy brome
atrazine + glyphosate	0.5 + 0.5	100	12.0	Severe drought stress
metribuzin + paraquat	1 + 0.5	100	11.3	Drought stress, light blue color
metribuzin + paraquat	2 + 0.5	100	20.3	No drought stress, no weeds
metribuzin + glyphosate	1 + 0.5	100	14.3	Some drought stress
metribuzin + glyphosate	2 + 0.5	100	20.0	No drought stress, no weeds
atrazine + lenacil + W.K. 1/	0.5 + 1	100	15.3	Slight drought stress, no weeds
cyanazine + paraquat	1.6 + 0.5	99	12.3	Moderate drought stress
cyanazine + paraquat	2.4 + 0.5	96	11.7	Drought stress, thin stand
cyanazine + glyphosate	1.6 + 0.5	100	15.0	No drought stress, good plots
cyanazine + glyphosate	2.4 + 0.5	100	17.7	Minor drought stress, good plots
cyanazine + carbetamide	1.6 + 2	100	13.0	Moderate drought stress, barley stunted
cyanazine + carbetamide	1.6 + 4	98	10.7	Severe drought stress, weedy
Check	-	-	4.7	

1/ Surfactant W.K. at 1/4% v/v

Wild oat control in spring barley treated at three to five leaf stage of wild oat. Alley, H.P. and N.E. Humburg. Plots were established on a barley field heavily infested with wild oat. Treatments were applied when the wild oat were in the three to five leaf stage of growth (mostly three-leaf).

All herbicides were applied with a three-nozzle spray unit in a total volume of 40 gpa water. Surfactants added to the HOE-23408 treatments were on a 0.5% v/v basis; whereas surfactant X-77 was added to all difenzoquat treatments at 7 cc/gal. Plots were one sq rd in size (9 ft by 30 ft), with a randomized complete block experimental design with three replications.

Visual evaluations were on 6/2/76 and 7/26/76, approximately 15 and 71 days following treatment.

Percentage wild oat control ratings were greater from the latter evaluations, indicating slow activity of the herbicides. (Wyoming Agric. Exp. Sta., Laramie, SR-764).

Wild oat control in spring barley treated at 3 to 5 leaf stage of growth of wild oat

Herbicide[1/]	Rate lb/A	Wild oat height inches 6/10/76	Barley height inches 7/26/76	Percent wild oat control[2/] 6/2/76	Percent wild oat control[2/] 7/26/76	Delay-days barley heading ± check	Yield[3/] bu/A
HOE-23408	0.5	5.3	18.6	30	93	0	21.7
HOE-23408	0.75	4.0	18.0	30	92	-2	21.6
HOE-23408	1	3.0	17.7	40	97	-1	19.4
HOE-23408	1.25	3.0	18.7	60	99	-1.7	18.5
HOE-23408	2.5	2.0	17.0	80	99	-5.3	13.8
HOE-23408 + (Surf A-Regal)[4/]	0.5	3.3	17.6	30	92	-2.7	16.7
HOE-23408 + (Surf A-Regal)	0.75	3.3	19.0	40	96	-3.3	20.3
HOE-23408 + (Surf A-Regal)	1	3.0	17.0	50	99	-4.3	18.6
HOE-23408 + (Surf B-Triton X)	0.5	4.7	21.0	20	90	+1	21.4
HOE-23408 + (Surf B-Triton X)	0.75	3.7	16.7	30	95	-1.7	25.7
HOE-23408 + (Surf B-Triton X)	1	3.3	22.9	60	98	-1	19.6
difenzoquat + 2,4-D amine	0.75 + 0.5	7.3	21.7	10	27	0	22.8
difenzoquat + 2,4-D ester	0.75 + 0.5	4.0	21.7	30	70	-1.7	25.6
difenzoquat + 2,4-D amine	1 + 0.5	5.3	21.0	30	63	-1	25.3
difenzoquat + 2,4-D ester	1 + 0.5	3.0	21.7	30	82	-1	26.8
difenzoquat	1	3.7	19.0	60	88	0	25.4
2,4-D amine	0.5	12.7	23.3	0	0	0	23.1
Check	-	12.0	20.7	-	-	-	20.5

1/ Treated 5/18/76, wild oats 3 to 5 leaf stage of growth
2/ Visual evaluations 6/2/76 and 7/27/76
3/ Harvested 7/26/76
4/ Surfactants added at 0.5% v/v

Wild oat control in spring barley treated at one to three leaf stage of wild oat. Alley, H.P. and N.E. Humburg. Plots were established on a barley field heavily infested with wild oat. HOE-23408 with and without surfactants were applied postemergence to the barley (Steptoe) when the wild oat were in the one to three leaf stage of growth (mostly two-leaf).

All herbicides were applied with a three-nozzle knapsack spray unit in a total volume of 40 gpa water. Surfactants added were on a 0.5% v/v basis. Plots were one sq rd in size (9 ft by 30 ft) with a randomized complete block design with three replications. The soil moisture was near field capacity at the time of treatment.

Visual evaluations, twelve days following treatment, indicated no real differences between the rates of HOE-23408 as to its activity on wild oat or phytotoxicity to the barley. The wild oat had yellowed and the leaf tips dried back 1/2 to 3/4 inch. There was no apparent damage to barley at this date of evaluation. There appeared to be no differences when Triton X was used; however, Regal A caused barley damage with drying 1 to 1.5 inches of the leaf tip.

In all instances percentage control ratings were greater on the 7/26/76 evaluation date than from earlier readings taken on 6/2/76. (Syoming Agric. Exp. Sta., Laramie, SR 763).

Wild oat control in spring barley tested at one to three leaf stage of wild oats

Herbicide[1/]	Rate lb/A	Wild oat height inches 6/10/76	Barley height inches 7/26/76	Percent wild oat control[2/] 6/2/76	Percent wild oat control[2/] 7/26/76	Delay-days barley-heading ± check	Yield[3/] bu/A
HOE-23408	0.5	5.7	16.3	50	50	-2.3	23.9
HOE-23408	0.75	4.3	16.0	50	80	-2.7	26.2
HOE-23408	1	4.6	17.3	40	72	-1.0	25.1
HOE-23408	2	2.0	17.0	80	83	-5.0	28.0
HOE-23408 + (Surf A-Regal)[4/]	0.5	4.3	18.0	50	77	-2.0	20.5
HOE-23408 + (Surf A-Regal)	0.75	3.7	18.3	70	73	-4.3	26.7
HOE-23408 + (Surf A-Regal)	1	3.0	21.3	80	88	-4.7	41.8
HOE-23408 + (Surf B-Triton X)	0.5	5.7	17.0	50	70	-1.7	24.7
HOE-23408 + (Surf B-Triton X)	0.75	4.3	19.7	60	89	-3.3	35.8
HOE-23408 + (Surf B-Triton X)	1	4.3	18.7	70	87	-3.7	31.9
Check	-	12.7	18.0	0	0	0	13.4

1/ Treated 5/6/76 wild oats 1 to 3 leaf stage of growth

2/ Visual evaluations 6/2/76 and 7/26/76

3/ Harvested 7/26/76

4/ Surfactants added at 0.5% v/v

Preplant, postemergence and complementary preplant plus postemergence wild oat control. Alley, H.P. and N.E. Humburg. Preplant, postemergence and complementary preplant plus postemergence evaluation studies were established under irrigation at Lander and Riverton, and at a dryland Sheridan location to compare the effectiveness of three treatments for wild oat control in barley. Moravian III, a two-row malting barley, was seeded at Lander and Riverton and Steptoe, a 6-row barley was seeded at Sheridan.

Plots were 15 ft by 26 ft in size with a randomized complete block experimental design with three replications. The preplant treatment, triallate, was applied at the Lander and Riverton sites on 3/23/76, incorporated and the plots seeded the same day. The Sheridan plots were treated, incorporated, and seeded 4/9/76. Postemergent treatments were applied at Lander and Riverton on 5/6 and 5/7, 1976 and at Sheridan 5/4/76. Wild oats were in the two to three leaf stage of growth at Riverton, one to two leaf stage at Lander and one to three leaf stage at Sheridan at time of post application. Barban was applied post at two dates to the same plots. Due to the poor wild oat control obtained with HOE-23408, from the first application date at Lander, the two rates of HOE-23408 were applied again on 5/9/76.

Percentage wild oat control was determined by counting the wild oats in a sq ft quadrat, in each of the plot areas. The variation in wild oat control between the three locations could be attributed to non-uniform stands and variability in emergence. However, the predictability of control follows the same trend as evidenced in the 1975 trials. Both studies, 1975 and 1976, clearly show the value of the preplant plus postemergence combination treatment. Neither the preplant nor the post treatments alone performed satisfactorily at all locations. Where triallate was applied preplant and HOE-23408 applied postemergent the wild oat control ranged from 84 to 100% with an average for all three locations of 91 and 92%, respectively, for the HOE-23408 at 0.75 and 1.0 lb/A. (Wyoming Agric. Exp. Sta., Laramie, SR 765).

Wild oat control - three locations in Wyoming

Herbicide and rate lb/A		Percent wild oat control			
Preplant	Postemergence	Lander	Riverton	Sheridan	Mean
triallate 1.25		85	24	59	56
triallate 1.25 +	difenzoquat 1.0	97	10	89	65
triallate 1.25 +	HOE-23408 0.75	92	100	81	91
triallate 1.25 +	HOE-23408 1.0	84	97	96	92
triallate 1.25 +	barban 0.375	85	66	75	75
	difenzoquat 1.0	66	0	85	50
	HOE-23408 0.75	93	76	0	56
	HOE-23408 1.0	91	83	56	77
	barban 0.375	54	0	0	18

Evaluation of preplant incorporated herbicides for the control of resistant weeds in Fordhook lima beans. Agamalian, H.S. The recent registration of alachlor has greatly enhanced the control of hairy nightshade and yellow nutsedge in lima beans. Current practice is to combine alachlor with trifluralin as a preplant incorporated treatment.

The objectives of this study were to compare several dinitro analine type herbicides for nightshade control and combinations with alachlor.

The herbicides were incorporated to a depth of three inches into pre-irrigated soil. Soil analysis was 30% clay, 42% silt, 28% sand, and 1.2% organic matter. The variety Concentrate Fordhook was planted three inches deep. The crop germinated from soil moisture and received its first irrigation three weeks after germination.

Seventy percent or greater hairy nightshade control was obtained with three dinitro analine type herbicides; dinitramine, ethafluralin and phenoxalin.

Alachlor in combination with dinitro analine herbicides gave acceptable hairy nightshade control. Metolachlor also gave acceptable nightshade control. Yellow nutsedge was controlled with alachlor and metolachlor.

Weed control, crop phytotoxicity and yield data are summarized in the following table. (Cooperative Extension, University of California, Salinas, CA 93901).

Preplant incorporated herbicides for the control of resistant weeds in lima beans

Herbicides	lb/A	Percent control 1/ HNS	Percent control 1/ YNS	Crop response Injury	Crop response Yield lb/A 2/	
dinitramine	0.33	20	47	0	5412	ab
dinitramine	0.38	90	30	0.3	4752	a
dinitramine	0.50	97	57	1.5	4910	a
dinitramine	0.75	100	50	1.5	4989	a
fluchloralin	0.75	34	20	0.5	4250	a
fluchloralin	1.5	67	44	1.0	3669	b
ethafluralin	1.0	71	56	0.3	6280	ab
ethafluralin	1.5	100	61	1.0	5517	ab
butralin	1.5	24	53	0	4910	a
butralin	3.0	35	47	1.0	4435	a
alachlor	3.0	99	96	1.0	4910	a
metolachlor	3.0	88	96	0.2	5385	ab
penoxalin	0.75	71	62	0.8	4910	a
penoxalin	1.5	85	54	1.3	4620	a
alachlor +	3.0					
ethafluralin	1.25	100	97	1.0	5016	ab
alachlor +	3.0					
dinitramine	0.5	97	96	0.8	5253	ab
alachlor +	3.0					
trifluralin	0.75	98	98	0.5	4910	a
alachlor +	3.0					
fluchloralin	0.75	72	89	1.7	4514	a
alachlor +	3.0					
penoxalin	0.75	99	97	0.8	4963	a
chloramben +	3.0					
butralin	1.5	81	31	0.5	5385	ab
chloramben	3.0	84	55	0.3	5253	ab
control	-	0	0	0.8	4593	

1/ Percent control based on weed counts
HNS = hairy nightshade YNS = yellow nutsedge

2/ Means with the same letter(s) within each column are not significantly different at the 5% level

<u>Tolerance of three common dry beans to preplant incorporated herbicides</u>. Orr, J.P., L. Lorentzen, and D. Martella. The herbicides listed in the following table were applied preplant incorporated on 6/16/76. Applications were made at Cosumnes Junior College on a clay loam soil with 0.6% organic matter, 31.6% sand, 28.6% silt, and 39.8% clay.

All herbicides were applied with a single nozzle CO_2 spraying unit in a total volume of 50 gpa water. The plots were nine beds, 30 inch row spacing by 20 ft, randomized with three replications. Treatments were incorporated to a depth of 1.25 inches by means of a power tiller with L-shaped knives. Three common beans consisting of reds, Sutter pinks and small whites were planted immediately after incorporation of the herbicides.

Penoxalin at the 1.5 lb/A rate gave moderate stand and vigor reduction to the red beans. The 1.5 and 3.0 lb/A rates gave moderate to severe necrosis on the small whites. Ethafluralin at the 1 lb/A rate showed slight chlorotic spots on the red beans. Tolerance was good with all the other treatments. (Cooperative Extension, University of California, Sacramento, CA 95813).

Tolerance of three common dry beans to preplant incorporated herbicides Sacramento, CA

Treatments[1/]		Rate lb/A	Red beans[2/] Reduction Stand	Red beans[2/] Reduction Vigor	Sutter pinks[2/] Reduction Stand	Sutter pinks[2/] Reduction Vigor	Small whites[2/] Reduction Stand	Small whites[2/] Reduction Vigor	Observations
ethafluralin	3E	0.75	0	0	0	0	0	0	
ethafluralin	3E	1.0	0	0	0	0	0	0.1	Slight chlorotic spots on red beans
ethafluralin	3E	1.5	1.3	1.3	0	0.6	0	1.3	
alachlor	4E	3.0	0	0	0	0	0	1.0	
control	-	-	0	0	0	0	0	0	
penoxalin	4E	0.75	0	0	0	0	0	0	
panoxalin	4E	1.5	3.3	3.3	0	0	0	1.0	Moderate to severe necrosis on small whites
penoxalin	4E	3.0	1.0	1.0	0	0	0	1.0	Moderate necrosis on small whites
EPTC	7E	3.0	0	0	0	0	0	0	

1/ Treated 6/16/76

2/ Rated 7/7/76

Weed control in dry beans. Hill, J.E., R.F. Norris and N.L. Smith. Short residual herbicides are needed to control weeds and fit into the crop rotation programs of California dry bean growers. A trial was established on the experimental farm of the University of California at Davis to test the effectiveness and dry bean tolerance to preplant incorporated and postemergence herbicides.

Herbicides, broadcast over a 15 ft length of six 30 inch beds, were applied with a CO_2 constant pressure sprayer at 40 gpa and incorporated in 8 inch bands with a Marvin rowmaster power driven tiller. The preplant applications were made on 5/18/76. EPTC was incorporated to 3 1/2 inches whereas all other herbicides were incorporated to a 2 inch depth. When EPTC was used in combination it was applied first and incorporated to 3 1/2 inches followed by an incorporation of the second applied material to 2 inches. The plot area was preirrigated. Barnyardgrass was sown into the experimental area prior to the herbicide treatment. Blackeye, kidney, and large lima beans were planted so that the 15 ft by 15 ft treated area contained two rows of each bean type. The seed was planted approximately 4 inches deep into moisture.

Bentazon, RH-6201, and dichlofop-methyl were applied postemergence in 40 gpa on July 2, 1976. Beans were in the flowering stage, barnyardgrass was four leaf to tillering and sunflower was in the two to eight leaf stage. Barnyardgrass populations were extremely high (50/sq ft).

Phytotoxicity evaluations were made June 8 and July 15. A single evaluation for control of watergrass and sunflower was made July 15 (see table).

Control of barnyardgrass was acceptable from all of the preplant herbicides, although metolachlor and alachlor exhibited slightly more activity. Dichlofop-methyl did not give acceptable control of barnyardgrass because of the lateness of the application with respect to barnyardgrass size. Bentazon gave acceptable sunflower control. EPTC alone or in combinations gave early injury to limas. Kidney beans showed some sensitivity to Dowco 356. Bentazon and RH-6201 produced some phytotoxic effects on all bean types although blackeyes were particularly sensitive. Apparent differences in growth between treated and untreated beans disappeared after about three to four weeks following the postemergence treatment.

The experimental site was seeded to grain on November 17, 1976. No carry-over was observed from any of the herbicide treatments. (University of California, Botany Department, Davis, CA 95616).

Herbicides for weed control in dry beans

Herbicide	Rate lb/A	Control[1] barnyardgrass 7/15/76	Control[1] sunflower 7/15/76	Phytotoxicity[2] Blackeye 6/8/76	Blackeye 7/15/76	Kidney 6/8/76	Kidney 7/15/76	Lima 6/8/76	Lima 7/15/76
Preplant incorporated									
trifluralin	0.75	6.3	5.3	1.0	0	1.0	0	2.3	0
ethafluralin	0.75	8.0	4.3	1.0	0.3	1.0	0	2.0	0
ethafluralin	1.5	8.0	8.0	1.0	0.3	1.0	0.3	1.7	0.3
dinitramine	0.375	6.7	3.3	1.7	0.3	0.7	0	2.0	0
dinitramine	0.75	7.0	5.0	1.7	0.3	1.0	0	1.7	0
butralin	2.0	7.7	6.7	1.0	0.3	0.7	0	2.0	0
butralin	4.0	8.3	6.3	1.0	0	0.7	0	2.0	0
alachlor	3.0	8.7	4.7	1.0	0.3	1.3	0	2.7	0
metolachlor	2.5	9.6	5.0	1.0	0.7	1.0	0	1.7	0
metolachlor	5.0	9.1	5.0	1.0	0.7	1.0	0.5	2.0	0.7
VEL 5052	3.0	7.7	5.0	1.0	0	1.0	0.3	2.0	0.3
Dowco® 356	3.0	7.7	4.0	1.3	0.7	2.7	0.3	2.7	0.3
trifluralin + alachlor	0.75 + 3.0	9.1	6.3	1.0	0.3	0.7	0	2.0	0
dinitramine + alachlor	0.375 + 3.0	8.3	5.7	1.0	0.7	1.0	0.3	1.7	0
butralin + alachlor	2.0 + 3.0	9.0	2.0	1.3	0	1.0	0	3.0	0
profluralin + metolachlor	0.75 + 2.5	6.9	6.0	1.3	0	1.0	1.7	2.0	1.7
EPTC	3.0	6.3	5.7	2.3	0.3	1.7	0	5.3	0.3
trifluralin + EPTC	0.75 + 3.0	8.3	5.3	2.0	0	1.7	0.3	4.7	1.0
profluralin + EPTC	0.75 + 3.0	8.0	2.3	2.7	0.3	1.0	0	4.7	0.3
Postemergence									
bentazon	0.75	0.3	8.0	-	2.7	-	1.7	-	1.3
bentazon	1.5	0.3	9.0	-	3.0	-	2.3	-	1.7
RH-6201	0.5	0.7	4.7	-	3.0	-	1.3	-	0.7
RH-6201	1.0	1.3	7.3	-	4.3	-	2.3	-	2.0
dichlofop-methyl	2.0	4.3	7.7	-	0.3	-	0	-	0.3
dichlofop-methyl	4.0	6.3	4.7	-	0	-	1.0	-	1.0
control	-	0.3	4.0	1.0	0.3	0.7	0.3	2.0	0.7

[1] Control: 0 = none, 10 = complete
[2] Phytotoxicity: 0 = none, 10 = all dead
Average of 4 replications

Annual weed control in corn with preemergence plus postemergence treatments under sprinkler irrigation. Alley, H.P., N.E. Humburg and A.F. Gale. The experimental plots were established to evaluate annual weed control and corn tolerance from herbicides applied preemergence under overhead sprinkler at the Torrington Agricultural Substation. The corn (Horizon-KR870) was planted 5/11/76 and the herbicides applied immediately after the planting operation. Herbicides were applied full coverage to one sq rd plots, randomized with three replications. The experimental plots received 1/2 inch of water within 24 hrs of herbicide application. The soil was classified as a sandy loam consisting of 69.2% sand, 25.8% silt, 5.0% clay, 0.5% organic matter and a pH of 6.4.

The weed species complex and density per linear ft, 2.5 inches on either side of the untreated corn row were: redroot pigweed 0.5, lambsquarter 0.37, black nightshade 3.0, and green foxtail 2.2. Actual weed counts were taken to compute percentage weed control 6/15/76, 35 days following treatment. Two post treatments were applied 6/11/76, 30 days after planting.

The herbicides VEL-5026 and bifenox, in combination with alachlor caused considerable injury to the corn. Corn plants exhibited the common bifenox symptoms, whereas VEL-5026 caused a flaccid, chlorotic condition at the lower rates of application to near 50% reduction in corn stand at the higher rate of application.

Twelve of the preemergence treatments resulted in 100% control of the weed species recorded. Eight of the treatments, six preemergence and two postemergence, did not result in the spectrum of weed control deemed essential to be considered as outstanding treatments. (Wyoming Agric. Exp. Sta., Laramie SR 755).

Annual weed control and corn stand with preemergence plus postemergence treatments under sprinkler irrigation Torrington Agricultural Substation

Herbicide(s)	Rate lb/A	Weed control 1/ PW	LQ	NS	GF	Corn 2/ Stand	Injury
metolachlor 6E	2	25	33	100	97	98	0
metolachlor 6E + procyazine 80W	1 + 1	64	100	100	96	100	0
metolachlor 6E + procyazine 80W	1.25 + 1.25	95	100	100	100	100	7
metolachlor 6E + atrazine 4L	1.25 + 1	100	100	100	100	98	0
metolachlor 6E + atrazine 4.5L(prepack)	2.25	100	100	100	100	100	0
metolachlor 6E + dicamba	1.25 + 0.25	37	67	83	100	98	0
penoxalin	1.5	100	100	100	100	98	0
penoxalin + atrazine 4L	1 + 1	100	100	100	100	98	0
penoxalin + cyanazine 4L	1 + 2	100	100	100	100	98	0
bifenox WP + alachlor	1.5 + 2	100	100	100	100	100	26
bifenox Fl + alachlor	1.5 + 2	100	100	100	100	100	20
bifenox WP + alachlor	1 + 2	100	100	100	100	96	27
bifenox Fl + alachlor	1 + 2	100	100	100	99	100	20
bifenox Fl + metolachlor 6E	1.5 + 2	100	95	100	100	100	20
alachlor + atrazine Fl(prepack)	2 + 1	100	100	100	100	100	0
alachlor + atrazine 4L	2 + 0.5	100	100	100	98	98	0
alachlor + atrazine 4L	2 + 1	100	100	100	100	100	0
alachlor + cyanazine 4L	2 + 2	100	100	100	99	98	0
alachlor	2.5	100	21	100	100	96	0
VEL-5026 WP	0.125	90	100	100	61	100	0
VEL-5026 WP	0.25	86	100	100	74	100	33
VEL-5026 WP	0.5	100	100	100	100	48	85
metolachlor 6E + atrazine 4L(post) 3/	1.25 + 1	100	100	100	14	100	0
cyanazine 80WP + propachlor	1 + 2.4	100	100	100	97	100	0
cyanazine 80WP + alachlor 4L	1 + 2	94	100	100	98	100	0
cyanazine 4WDS + atrazine 4L	1.2 qt + 1.2 qt	100	100	100	100	98	7
cyanazine 4WDS + cyanazine 80WP + X-77(post)	1.2 qt + 1.2 qt	61	100	90	93	100	0
Check	-	-	-	-	-	100	0

1/ PW = redroot pigweed, LQ = lambsquarter, NS = black nightshade, GF = green foxtail
2/ Corn injury ratings: 0 = no damage, 100 = all plants dead
3/ post treatments applied 6/11/76

Sprinkler-applied preemergence herbicide for weed control in corn. Alley, H.P., N.E. Humburg and A.F. Gale. The application of preemergence herbicides and/or combinations was the third over a span of three years, which was initiated to determine the effectiveness and feasibility of applying herbicides through a center-pivot sprinkler system for weed control in corn in eastern Wyoming. The center-pivot sprinkler system treated 2.73 acres each hour with a delivery of approximately 0.5 inch of water. Each plot was six acres which required 2.2 hour runs per treatment. A piston pump was utilized to inject the herbicide solution into the system at a point 5 ft from the well head. The auxiliary pump delivered 422 ml of solution per minute. The soil was classified as a sandy loam (76.0% sand, 17.6% silt, 6.4% clay, 0.6% organic matter with a 7.5 pH). The corn was planted three days prior to herbicide application which was May 13 and 14, 1976.

The predominant weed species recorded on the circle were: redroot pigweed, Russian thistle, and green foxtail. Minor species included: buffalobur, common sunflower, skeletonweed, common lambsquarter, and field sandbur.

Two weed control evaluations were made, actual weed counts on 6/16/76, 33 days following application, and visual evaluations 8/5/76, 83 days following application. On the early evaluation date, five of the eight treatments gave 100% control of the major weed species recorded. Metolachlor exhibited weakness toward Russian thistle, EPTC + R-25788 a weakness on both redroot pigweed and Russian thistle and penoxalin + atrazine combination a weakness toward field sandbur. Late evaluations indicated what might be expected from the treatments included in the evaluations, which was lack of longevity of control by alachlor + cyanazine, considerable field sandbur reinfesting the butylate + R-25788 + atrazine treatment, and the weakness of EPTC + R-25788 toward redroot and Russian thistle and metolachlor toward Russian thistle. (Wyoming Agric. Exp. Sta., Laramie, SR 756).

Weed control and corn stand with preemergence herbicides applied through a center-plot sprinkler

Herbicides	Rate lb/A	Percent corn stand	Percent control[1] PW	RT	GF	Observations[2]
alachlor + cyanazine	2 + 1	96	100	100	100	Sandbur and Russian thistle in treated plots
metolachlor + atrazine	1.25 + 1	100	100	100	100	Excellent treatment, few Russian thistle seedlings
metolachlor	2	100	90	15	100	Excellent grass control, very poor Russian thistle and sunflower control
penoxalin + cyanazine	1 + 1	100	100	100	100	Excellent grass control, some pigweed and purslane seedlings
EPTC + R-25788	4	100	62	63	100	Excellent grass control, pigweed and Russian thistle 2 feet tall
penoxalin + atrazine	3 + 1	100	100	100	67	Excellent treatment, few pigweed seedlings 1 to 1-1/2 inches tall
butylate + R-25788 + atrazine	3 + 1	100	100	100	100	Considerable sandbur in patches (low areas)
atrazine	1.2	100	100	100	100	Equal to best treatment, some puncturevine and pigweed seedlings

1/ Actual weed counts 6/15/76 PW = redroot pigweed, RT = Russian thistle, GF = green foxtail

2/ Visual evaluations 8/5/76

Annual weed control in corn with preplant incorporated individual herbicides. Alley, H.P., N.E. Humburg and A.F. Gale. Plots were established at the Torrington Agricultural Substation 5/11/76 to compare the relative effectiveness of preplant incorporated individual herbicides under furrow irrigation and effect of delayed incorporation of thiocarbamate formulations. All herbicides were applied with a knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa water carrier. The treated plots were incorporated to a soil depth of 1.5 inches with a flex-tine harrow, either immediately after application, or delayed incorporation of 24 hours. The corn (Jacques 993) was planted 4 days later. The soil was classified as a loamy sand (78.3% sand, 20.3% silt, 1.4% clay, 0.9% organic matter with a 7.2 pH).

The weed species and density per linear ft, 2.5 inches on either side of the untreated corn row were: redroot pigweed 1.3, lambsquarter 3.2, black nightshade 0.83, and green foxtail 4. Weed density and corn stand counts were recorded 6/15/76, 35 days following treatment.

Delayed incorporation of the EPTC + R-25788 6.7E formulation appeared to have more influence on its weed control efficiency than the EPTC + R-25788 3S formulation. The EPTC + R-25788 3S formulation at 4 and 6 lb/A (0-hr incorporation) and procyazine at 1.6 + 2.0 lb/A gave 100% control of the weed spectrum without serious corn stand reduction or injury. (Wyoming Agric. Exp. Sta. Laramie, SR 757).

Corn stand and annual weed control with preplant incorporated individual herbicides

Herbicide	Rate lb/A	Percent control[2] PW	LQ	NS	GF	Corn[3] Stand	Injury
EPTC + R-25788 3S (0-hr)[1]	4	100	100	100	100	92	20
EPTC + R-25788 3S (0-hr)	6	100	100	100	100	96	20
EPTC + R-25788 6.7E (0-hr)	4	95	100	100	100	92	7
EPTC + R-25788 6.7E (0-hr)	6	100	99	100	100	95	13
EPTC + R-25788 3S (24-hr)	4	100	99	100	100	98	13
EPTC + R-25788 3S (24-hr)	6	100	93	100	100	100	20
EPTC + R-25788 6.7E (24-hr)	4	95	90	93	99	92	7
EPTC + R-25788 6.7E (24-hr)	6	95	92	100	100	96	7
butylate + R-25788 6.7E	4	100	90	100	100	100	0
butylate + R-25788 6.7E	6	100	94	100	100	98	0
metolachlor	2	98	98	93	93	92	13
procyazine 80W	1.6	100	100	100	100	100	0
procyazine 80W	2	100	100	100	100	96	0
Check	-	-	-	-	-	100	0

1/ Treatments incorporated as indicated at 0-hour and 24-hours after application

2/ PW = redroot pigweed, LQ = lambsquarter, NS = black nightshade, GF = green foxtail

3/ Corn injury ratings: 0 = no damage, 100 = all plants dead

Annual weed control in corn with preplant incorporated herbicide combinations. Alley, H.P., N.E. Humburg and A.F. Gale. Plots were established at the Torrington Agricultural Substation 5/11/76. All herbicides were applied with a knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa water carrier. The plots were one sq rd in size and the experimental design was a complete block with three replications. Treated plots were incorporated to a soil depth of 1.5 inches with a flex-tine harrow immediately following application. The corn (Jacques-993) was planted four days later. The soil was classified as a loamy sand (78.3% sand, 20.3% silt, 1.4% clay, 0.9% organic matter with a 7.2 pH).

The weed species and density per linear ft, 2.5 inches on either side of the untreated corn row, were: redroot pigweed 1.3, lambsquarter 3.2, black nightshade 0.83, and green foxtail 4. Weed density and corn stand were recorded 6/15/76, 35 days following treatment.

Five of the ten combination treatments resulted in 100% control of the weed spectrum evaluated with four giving 98% or greater control. The only weak combination was metolachlor + procyazine at 1.0 + 1.0 lb/A. (Wyoming Agric. Exp. Sta., Laramie, SR 758).

Corn stand and annual weed control with preplant incorporated herbicide combinations

Herbicides	Rate lb/A	Percent control 1/ PW	LQ	NS	GF	Corn Stand	Injury 2/
butylate 6.7E + R-25788 +	4						
cyanazine 4L	2	100	100	100	100	100	27
butylate 6.7E + R-25788 +	4						
atrazine 4L	1	100	100	100	100	98	7
butylate 6.7E + R-25788 +	4						
cyanazine (20 lb/A liq N)	2	100	100	100	100	94	7
butylate 6.7E + R-25788 +	4						
atrazine 4L (20 lb/A liq N)	1	100	100	100	100	100	0
metolachlor 6E +	1						
procyazine 80W	1	95	67	73	89	98	0
metolachlor 6E +	1.25						
procyazine 80W	1.25	100	100	100	99	92	7
metolachlor 6E +	1.25						
atrazine 4L	1	100	100	100	99	96	7
metolachlor 6E +							
atrazine (Prepack)	2.25	100	100	100	100	96	7
cyanazine 4WDS +	0.6 qt						
butylate 6.7E + R-25788	2.3 qt	95	100	100	99	100	0
cyanazine 4WDS +	0.6 qt						
EPTC 6.7E + R-25788	1.8 qt	100	100	100	98	98	0

1/ PW = redroot pigweed, LQ = lambsquarter, NS = black nightshade, GF = green foxtail

2/ Corn injury ratings: 0 = no damage, 100 = all plants dead

The effectiveness of EPTC plus R-25788, butylate plus R-25788, alachlor, perfluidone and bentazon for yellow nutsedge control in Jubilee variety of sweet corn. Stanger, C.E. Methods and materials used in establishing the plots and in evaluating the results are as follows. Each treatment was replicated three times on plots 4 rows wide and 30 ft long. All herbicides except bentazon were applied as broadcast treatments on May 24 and incorporated immediately after application with a power rototiller mounted in a bed shaper. Depth of incorporation was approximately 5 inches. The herbicides were applied with a bicycle-wheel type plot sprayer equipped with a nine-foot spray boom. Teejet nozzles, size 8003, were used with a spray pressure of 35 psi, applying water as a carrier at the rate of 43 gallons per acre. The plot area was irrigated prior to the application of the herbicides in preparation for planting. The soil texture was a loam with 1.1 percent organic matter and a pH of 7.3. The corn was planted the next day following the application and incorporation of the preplant treatments. Annual broadleaf and grassy weeds not controlled by the herbicide treatments were removed by handweeding. Subsequent irrigations during the growing season were by furrow-type irrigation.

The postemergence bentazon treatments were applied on July 12 as directed sprays. The corn was 2.5 to 3.0 feet tall when the bentazon treatments were applied and the yellow nutsedge plants varied in size from two leaves to a few plants with seed heads starting to form.

The results obtained from the treatments were evaluated on July 29 and August 31. The corn was hand harvested on September 1 and 2 for yield data.

Evaluations for yellow nutsedge control, just prior to harvest, showed that bentazon at both 2.0 and 3.0 lb/A resulted in excellent control. The nutsedge plants were necrotic and no new plants were emerging in the plot area.

Good control was obtained with perfluidone at the 3.0 and 4.0 lb/A rate. Some small nutsedge plants (three leaves four inches tall) were present in the plots treated with perfluidone at 2.0 lb/A. Alachlor effectively controlled the nutsedge during the growing season but some new growth of nutsedge was occurring primarily in the bottoms of the irrigation furrows.

The nutsedge control with butylate + R-25788 was slightly inferior to that obtained with alachlor. More late emerging nutsedge was evident in the butylate + R-25788 plots compared to the alachlor treatments.

EPTC + R-25788 was the poorer treatment, with a low percent control of nutsedge and many plants were well developed starting to form seed by harvest time. (Malheur Experiment Station, Ontario, OR 97914).

Percent control of yellow nutsedge and corn yields Ontario, Oregon 1976

Treatments	Rate lb/A	% Crop injury 1/				Percent yellow nutsedge control 2/ 7/29/76				8/31/76				Corn yields tons/A			
		R_1	R_2	R_3	Avg	R_1	R_2	R_3	Avg	R_1	R_2	R_3	Avg	R_1	R_2	R_3	Avg
EPTC + R-25788	4.0	10	5	15	10	50	70	60	60	40	40	50	43	6.3	6.6	6.2	6.4
butylate + R-25788	4.0	5	10	5	7	80	85	75	80	70	65	75	70	8.0	7.6	7.4	7.7
alachlor	3.0	5	0	5	3	90	90	85	88	85	85	80	83	8.2	7.8	8.0	8.0
perfluidone	2.0	5	5	5	5	60	70	65	65	70	65	75	70	7.6	7.2	7.4	7.4
perfluidone	3.0	10	5	5	7	90	90	85	88	85	90	85	86	7.2	7.6	7.1	7.3
perfluidone	4.0	10	10	10	10	95	90	95	93	90	85	90	88	6.9	7.2	7.0	7.0
bentazon	2.0	5	0	5	4	95	95	95	95	95	95	95	95	8.1	8.2	7.9	8.1
bentazon	3.0	10	5	10	8	100	100	100	100	95	100	98	98	8.3	8.0	7.9	8.1
Check	-	0	0	0	0	0	0	0	0	0	0	0	0	5.9	6.4	6.9	6.4

1/ Crop injury ratings were taken on 7/12/76 for preplant incorporated treatments and on 7/29/77 for postemergence applied bentazon treatments

2/ Ratings: 0 = no control, 100 = complete control

The effect of fonofos on corn tolerance to EPTC plus R-25788. Brewster, B.D. and A.P. Appleby. Although the addition of a protectant to EPTC has allowed the use of higher rates of EPTC on corn, occasional crop injury has resulted. A trial was conducted at Corvallis, Oregon in 1976 to determine whether this injury could result from an interaction with the insecticide fonofos.

The commercial formulations of EPTC + R-25788 and vernolate + R-25788 were used in this study. All of the pesticides were applied with a bicycle-wheel plot sprayer and were incorporated with a tractor-driven rototiller. Plots were 10 by 28 ft and treatments were replicated five times. Jubilee sweet corn was planted the day following treatment. The plots were watered as needed by an impulse sprinkler system.

In the fall, ears were harvested from 12 ft of row in each plot. The total fresh weights of the ears were recorded for each plot and the ears were then separated into mature, immature, and malformed ears.

The addition of fonofos at 2.0 lb/A to EPTC + R-25788 at 8.0 lb/A caused severe ear malformation and significantly reduced the total ear weight. None of the other treatments produced a significant effect on the corn except for a higher amount of mature ears in the plots treated with the lower rate of EPTC + R-25788. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

The effect of fonofos and herbicides on 'Jubilee' sweet corn

Treatment	Rate lb/A	Ear fresh wt lb/12 ft of row	Mature ears/ 12 ft of row	Immat ears/ 12 ft of row	Malform ears/ 12 ft of row
EPTC + R-25788	4.0	15.4	19.6	8.4	0.2
EPTC + R-25788	8.0	12.8	15.0	11.4	0.2
vernolate + R-25788	4.0	15.6	18.6	12.2	0
vernolate + R-25788	8.0	13.7	13.8	11.0	0
EPTC + R-25788 + fonofos	4.0 2.0	13.2	15.4	10.0	1.8
EPTC + R-25788 + fonofos	8.0 2.0	10.7	4.4	3.8	14.4
vernolate + R-25788 + fonofos	4.0 2.0	14.3	17.6	10.0	0.2
vernolate + R-25788 + fonofos	8.0 2.0	15.3	18.6	11.2	0.2
alachlor	4.0	13.1	15.8	9.6	0.2
alachlor + fonofos	4.0 2.0	14.5	18.0	9.8	0
fonofos	2.0	13.9	17.6	8.8	0.4
Hand-weeded check	-	13.4	15.8	9.8	0.4
$LSD_{.05}$		2.4	3.6	3.2	1.9
$LSD_{.01}$		3.2	4.8	4.3	2.5
CV		13.4%	17.7%	26.1%	9.7%

Tolerance of Pioneer 3780 field corn to preplant incorporated herbicide applications. Orr, J.P., L. Lorentzen, D. Martella. The herbicides listed in the following table were applied preplant incorporated on 6/16/76. Applications were made at Consumnes Junior College on a clay loam soil with 0.6% organic matter, 31.6% sand, 28.6% silt, and 39.8% clay. Pioneer 3780 was planted immediately after incorporation.

All herbicides were applied with a single nozzle CO_2 spraying unit in a total volume of 50 gpa water. The plots were 2 beds, 30 inch spacing by 20 ft, randomized with three replications. Treatments were incorporated to a depth of 2 inches by means of a power tiller with L-shaped knives. The plot was furrow irrigated.

The majority of the treatments gave slight to moderate stand and vigor reduction to the field corn. Treatments which gave no stand reduction and slight vigor reduction consisted of metolachlor at the 1.5 and 3.0 lb/A rate, EPTC + R-25788 at 3.0 + 0.25 lb/A, alachlor at 1.5 and 3.0 lb/A. (Cooperative Extension, University of California, Sacramento, CA 95813).

Tolerance of Pioneer 3780 field corn to preplant incorporated herbicide applications Sacramento, CA

Treatments 1/	Rate lb/A	Pioneer 3780 corn Stand reduction 2/	Vigor reduction 2/	Observations
metolachlor	1.5	0	1.0	
metolachlor	3.0	0	1.0	
EPTC + R-25788	6.0 + 0.5	0	0	
alachlor	1.5	0	0	
alachlor	3.0	0	1.5	
EPTC 6E	6.0	2.5	3.5	
metolachlor + atrazine 4L	1.25 + 1.0	3.5	2.5	
metolachlor + atrazine 4L	1.5 + 1.2	4.0	1.5	Mod-severe twisted plants
CGA-2758 4.5L	2.25	1.0	3.5	
CGA-2758 4.5L	2.7	0	5.5	Mod-severe twisted plants
metolachlor + procyazine	1.5 + 1.5	8.0	4.0	
R-33222 50W	1.5	5.0	2.0	
R-33222 50W	3.0	4.0	3.5	
R-37878+25788	4.0 + 0.6	2.0	2.0	Mod-severe twisted plants
R-37878+25788	6.0 + 1.0	2.0	2.0	
R-37878 6E	4.0	4.5	5.5	Mod-severe twisted plants
R-37878 6E	6.0	4.5	5.0	Mod-severe twisted plants
R-37878+25788 + atrazine 4L	4.0 + 0.6 + 1.0	2.5	2.5	
R-37878+25788 + atrazine 4L	6.0 + 1.0 + 1.5	4.5	5.5	Mod-severe twisted plants
MV-687 7E	2.0	4.5	5.0	
MV-687 7E	4.0	1.5	4.5	
MV-687 + R-25788	4.0 + 1.0	3.0	1.5	
MV-687 + R-25788	1.5 + 0.6	1.5	2.0	Mod-severe twisted plants
R-33222+25788	3.0 + 1.0	2.5	1.5	
R-33222+25788	0.75	1.5	1.0	
ethalfluralin 3E	1.5	3.0	4.0	
ethalfluralin 3E	3.0	4.5	4.5	
EPTC 6E	3.0	1.0	1.5	Mod-severe twisted plants
Control	-	0	0	

1/ 6/16/76 2/ 8/4/76 Rating scale 0 - 10

<u>Control of yellow nutsedge in field corn with preplant incorporated herbicides.</u> Orr, J.P. The herbicides listed in the following table were applied preplant incorporated on 4/16/75. Applications were made at Courtland California on a clay loam soil with 1 to 2% organic matter.

All herbicides were applied with a triple nozzle CO_2 sprayer unit in a total volume of 50 gpa. The plots were 25 by 25 ft, randomized with four replications. Treatments were cross disc incorporated immediately after application at a depth of 4 inches. The trial was planted flat three weeks later and furrow irrigated three weeks after planting.

Metolachlor at 2.0, 2.5 and 5.0 lbs/A; alachlor at 2.5 and 3.0 lbs/A; butylate + R-25788 4.0 + 0.32 lbs/A; and EPTC + R-25788 3.0 + 0.25 + 6.0 + 0.5 gave excellent control of yellow nutsedge. A slight stand reduction was obtained with most treatments. There was no vigor reduction and no ear damage at maturity. (Cooperative Extension, University of California, Sacramento, CA 95813).

Control of yellow nutsedge in field corn Sacramento, CA

Treatments 1/		Rate lb/A	Yellow 2/ nutsedge control	Field corn 2/ stand # plants/treat	Vigor reduction	Ear damage
metolachlor	6E	2.0	9.95	24.7	0	0
metolachlor	6E	2.5	9.90	30.0	0	0
metolachlor	6E	5.0	9.85	35.5	0	0
alachlor	4E	2.5	9.90	31.6	0	0
alachlor	4E	3.0	9.92	29.5	0	0
butylate +	6E	4.0				
R-25788		0.32	9.92	32.2	0	0
EPTC +	6E	3.0				
R-25788		0.25	9.47	32.6	0	0
EPTC +	6E	6.0				
R-25788		0.5	9.75	33.2	0	0
Control		-	0	35.0	0	0

1/ Treated 4/16/75

2/ Rated 5/21/75 and 10/1/75

Rating: 0 - 10

Weed control in field corn with preplant incorporated herbicides. Orr, J.P. The herbicides listed in the following table were applied preplant incorporated 5/20/75. Applications were made on a sandy clay loam soil in Elk Grove, California.

All herbicides were applied with a single nozzle CO_2 spraying unit in a total volume of 50 gpa water. The plots were one bed, 30 inch row spacing by 20 ft, with three replications. The treatments were incorporated at a 2 inch depth with a power tiller with L-shaped knives. The field corn was planted the same day.

Metolachlor at 1.5 lbs/A gave good control of purslane and poor control of pigweed and lambsquarter. At the 3.0 lb/A rate, good control of pigweed and purslane was obtained with poor lambsquarter control. The 5.0 lb/A rate gave excellent control of all three weed species. Butylate at 4.0 lbs/A gave excellent control of pigweed and good control of purslane and lambsquarter. EPTC + R-29148 at 3.0 + 0.25 lbs/A gave good control, with excellent control at the 6.0 + 0.5 lb/A rate. R-33222 at 4.0 lbs/A gave excellent control of pigweed, purslane and lambsquarter. The 2.0 lb/A rate gave excellent control of pigweed and purslane, with good control of lambsquarter. EPTC + R-25788 6.0 + 0.5 lbs/A gave good control of pigweed and excellent control of purslane and lambsquarter.

A slight stand reduction in the field corn was obtained with EPTC + R-29148 at the 6.0 + 0.5 lb/A rate; and butylate at the 4.0 lb/A rate. (Cooperative Extension, University of California, Sacramento, CA 95813).

Weed control in field corn with preplant incorporated herbicides, Elk Grove, CA

Treatments[1/]	Rate lb/A	Control rating[2/] pigweed	purslane	lambsquarter	Field corn[2/] Plants/ treated	Vigor reduction
metolachlor 6E	1.5	6,5	8.6	5.0	27	0
metolachlor 6E	1.5	6.5	8.6	5.0	24	0
metolachlor 6E	5.0	10.0	10.0	10.0	28	0.7
alachlor 4E	2.5	9.8	9.8	10.0	26	0
alachlor 4E	3.0	10.0	10.0	10.0	27	0.3
butylate 6E	4.0	10.0	9.0	8.3	24	0
EPTC + R-29148 6E	3.0	8.3	9.1	9.3	28	0.6
EPTC + R-29148 6E	6.0	9.6	10.0	10.0	25	0
R-33222 50W	2.0	9.8	9.8	9.2	27	0
R-33222 50W	4.0	9.6	10.0	10.0	26	0
Control	-	0	0	0	29	0
EPTC + R-25788 6E	6.0	9.3	9.9	10.0	27	0

1/ 5/20/75
2/ 6/10/75
Rating scale: 0 - 10

Weed control in field corn with preplant incorporated herbicides. Orr, J.P. The herbicides listed in the following table were applied preplant incorporated on 4/25/75. Applications were made on a sandy loam soil.

All herbicides were applied with a triple nozzle CO_2 spraying unit in a total volume of 50 gpa water. The plots were 25 ft by 25 ft, randomized with three replications. Treatments were cross disked incorporating the herbicides at three to four inches. The field corn was planted the following day on 30 inch row spacing.

The treatments gave good to excellent control of lambsquarters and yellow nutsedge; and poor control of jimson weed; with no stand or vigor reduction to the field corn. (Cooperative Extension, University of California, Sacramento, CA 95813).

Weed control in field corn with preplant incorporated herbicides Sacramento, CA

Treatment 1/	Rate lb/A	Control rating 2/ jimson weed	lambs-quarter	yellow nutsedge	Field corn plants/treat	Vigor reduction
metolachlor 6E	1.5	3.3	9.0	10.0	41	0
metolachlor 6E	2.0	3.3	9.9	10.0	41	0
metolachlor 6E	4.0	6.6	9.3	10.0	42	0
alachlor 4E	2.0	1.6	9.9	10.0	40	0
alachlor 4E	2.5	0	9.6	10.0	43	0
butylate 6E +	4.0					
R-25788	0.32	5.0	8.2	10.0	40	0
EPTC 6E +	3.0					
R-25788	0.25	6.6	10.0	10.0	43	0
EPTC 6E +	6.0					
R-25788	0.5	6.6	6.6	10.0	42	0
Control	-	0	0	0	42	0

1/ Treated 4/25/75

2/ Readings 5/25/75 and 9/1/75

Rating scale: 0 - 10

Rates of glyphosate over-the-top of cotton. Arle, H.F. and K.C. Hamilton. The effects of rates of glyphosate applied over-the-top of cotton was studied at the Cotton Research Center, Phoenix, Arizona in 1976. Deltapine 61 cotton was planted in April. Annual weeds were controlled on all plots by: (1) 0.5 lb/A of trifluralin disked into the soil before furrowing for the preplanting irrigation and (2) 1 lb/A of diuron applied before the second postemergence irrigation as a directed spray covering the furrow and base of cotton plants. Glyphosate at 2, 4, 6, 8, 10, 12, and 14 oz/A was applied over the top of cotton (14 inches tall) on June 9, 1976. Glyphosate was applied in 40 gpa of water. Treatments were replicated four times on four row plots 41 feet long. The response of cotton to treatment was noted each week. In November, the center rows of each plot were machine picked.

Within one week after treatment, 8 oz/A or more of glyphosate caused wilting of cotton plants. Cotton treated with 8 oz/A or more of glyphosate remained stunted for more than 10 weeks after treatment (table). At harvest, bolls on cotton treated with glyphosate appeared reduced in size but yield of seed cotton was not reduced by applications of 2 to 8 oz/A of glyphosate over-the-top of cotton in June. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Cotton growth and yield after over-the-top applications of glyphosate at Phoenix, Arizona

Glyphosate oz/A	Cotton plants July	Yield of seed cotton 1/ lb/A
0	Normal	3,840 a
2	Normal	3,960 a
4	Normal	3,940 a
6	Normal	3,940 a
8	Stunted	3,580 ab
10	Stunted	3,050 b
12	Stunted	3,030 b
14	Stunted	1,860 c

1/ Values followed by the same letter are not significantly different at the 5% level

Time of glyphosate over-the-top of cotton. Hamilton, K.C. and H.F. Arle. The effect of over-the-top applications of 1 oz/A of glyphosate on cotton during the growing season was studied at the Cotton Research Center, Phoenix, Arizona in 1975 and 1976. Deltapine 61 cotton was planted in April. Annual weeds were controlled on all plots by: (1) 0.5 lb/A of trifluralin disked into the soil before furrowing for the preplanting irrigation and (2) 1 lb/A of diuron applied before the second postemergence irrigation as a directed spray covering the furrow and base of cotton plants. Glyphosate was applied over-the-top of cotton at three-week intervals starting on May 14, 1975, and May 19, 1976. Treatments were replicated four times on four row plots 41 ft long. The response of cotton to treatment was noted each week. Samples for study of boll components and fiber properties were obtained before harvest. In November, the center rows of each plot were machine picked.

Each year, over-the-top applications of 1 oz/A of glyphosate produced no visible effect on growth of cotton. In 1975, diuron symptoms appeared in upper leaves of cotton about two weeks after applications of glyphosate from June 4 to August 27. This did not occur in 1976. Application of glyphosate over-the-top of cotton had no effect on cotton yield (table), boll components, or fiber properties. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Cotton yield after over-the-top applications of one oz/A of glyphosate at 3 week intervals at Phoenix, Arizona

Treatment Weeks after emergence	Yield of seed cotton[1/] lb/A	
	1975	1976
Untreated	2,300 a	3,860 a
3	2,320 a	4,080 a
6	2,280 a	3,860 a
9	2,530 a	4,040 a
12	2,530 a	4,040 a
15	2,440 a	3,960 a
18	2,360 a	4,060 a
21	2,470 a	4,020 a

1/ In a column, values followed by the same letter are not significantly different at the 5% level

Evaluation of herbicides and techniques for nutsedge control in cotton. Kempen, H.M. and J. Hill. Several trials in cotton show three new herbicides to warrant further University and industry testing for nutsedge control in cotton. H 26910, Dowco 295 and EL 171 showed adequate safety and efficacy in 2 to 10 tests. H 26910 is not too effective on purple nutsedge, unlike Dowco 295, but is adequate on barnyardgrass unlike Dowco 295. Dowco 295 appears to persist about two weeks longer than H 26910 but both are inactivated in two to four months. Industry tests indicate EL 171 may be too persistent to use in annual crops. Best control with it is obtained from preplant applications months in advance of planting.

The trials suggest that applications of H 26910, Dowco 295 and perhaps alachlor should be made at planting in order to obtain maximum safety and adequate longevity. Because cotton is planted into moist soil, incorporation is necessary. Adequate incorporation has been achieved two ways; one by rototilling herbicides into pre-irrigated beds and the second by the "rocap" technique. This technique involves removal of dry bed tops using a dirt pusher, spraying, incorporating with two gangs of rolling cultivators in tandem 14 inches wide, followed by the planter. This "rolling cultivator at planting" rocap technique is widely used for band incorporating dinitro-anilines at planting in cotton, napropamide and pebulate or diphenamid in tomatoes, and TCA + pryazon in sugar beets.

Further studies are planned to obtain more data and hopefully a registration within the next decade. (University of Calif. Coop. Extension, Bakersfield and Davis, CA).

Perennial grass control in peppermint with HOE 29152. Brewster, B.D. and A.P. Appleby. Several annual and perennial grasses are problems in Oregon peppermint fields. These grass problems have intensified with the advent of non-tillage and the exclusive use of terbacil. A new herbicide, HOE 29152, was investigated for peppermint tolerance and efficacy at two locations. Postemergence applications of 1.0 and 3.0 lb/A were made in the spring of 1976 to 10 by 25 ft plots.

At one location, perennial ryegrass was adequately controlled with 1.0 lb/A, but 3.0 lb/A was required to control quackgrass at the other location. Crop tolerance appeared excellent as no peppermint injury was observed at either location.

Further research with this herbicide in peppermint will include the use of surfactants to enhance herbicidal activity. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

Canada thistle control in peppermint with bentazon. Brewster, G.C. and A.P. Appleby. Bentazon has shown promise for Canada thistle control in peppermint but results in western Oregon have been erratic. Field experiments were conducted to determine the optimum timing of bentazon on

Canada thistle and to determine the tolerance of peppermint to bentazon. All treatments were applied to 10 by 25 ft plots and were replicated five times.

At two locations, treatments were applied as single or split applications in Canada thistle-infested peppermint fields. Applications were made from early May when the thistles were less than 10 inches tall and continued through the end of June when the thistles were up to 50 inches tall and in the bud stage. No peppermint injury was observed at harvest.

Canada thistle control ratings are presented in Table 1. These data indicate that single applications and early split applications were less consistent than split applications made from mid-May to late June.

Bentazon applications to weed-free peppermint in western and central Oregon did not reduce mint hay yields until application rates exceeded 4 lb/A. Even rates as high as 12 lb/A in a single application or 16 lb/A in a split application did not drastically reduce hay yields. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

Table 1 Canada thistle control in western Oregon peppermint with bentazon

Treatment	Rate lb/A		% Canada thistle control		
			Location		
	Early May	Mid-May	1	2	Avg
bentzaon	3	-	20	25	22
bentazon	2	2	85	28	56
	Mid-May	Late May			
bentazon	3	-	47	41	44
bentazon	6	-	86	72	79
bentazon	2	2	97	82	89
	Early June	Mid-June			
bentazon	3	-	85	77	81
bentazon	2	2	93	95	94
bentazon	-	3	62	83	72
	Mid-June	Late June			
bentazon	2	2	91	93	92

Table 2 Peppermint tolerance to bentazon

Treatment	Rate lb/A		Fresh hay - lb/27 sq ft	
	Late May	Early June	Loc. 1	Loc. 2
Untreated check	0	0	23.6	18.0
bentazon	3	-	21.8	18.8
bentazon	6	-	19.9	16.7
bentazon	12	-	18.1	-
bentazon	2	2	22.1	17.5
bentazon	4	4	21.3	16.3
bentazon	8	8	20.1	-
$LSD_{.05}$			2.3	n.s.

Control of volunteer legumes in red clover by activated carbon seedlings. Rolston, M.P. and A.P. Appleby. Volunteer legumes germinating from hard seed can contaminate new seedings of legumes established for seed production. There are no herbicides registered for the control of either intervarietal contamination or for interspecific contamination, e.g., alfalfa in red clover. Use of the activated carbon banding technique that has been established in Oregon for seeding grasses is one possible approach to this problem.

Preemergence application of diuron in the greenhouse gave GR_{50} values of 0.31 and 0.46 kg/ha for Kenland red clover and Dupuits alfalfa, respectively. In another study, 0.5 and 1.0 kg/ha of diuron reduced red clover seedling numbers by 96.6 and 100%, respectively, and alfalfa 72.3 and 85.3%, respectively.

A field experiment was established in the spring of 1976 to determine the tolerance of Kenland red clover to diuron (0, 2.0, and 4.0 kg/ha) seeded with a 2.5 cm band of activated carbon applied at a rate equivalent to 330 kg/ha. The experiment was a randomized block design of five replications with 2.5 by 6.5 m plots and rows 30 cm apart.

The experiment was seeded on May 11 and sprayed May 12 with a bicycle sprayer. Irrigation was applied when necessary and on October 8, a 0.9 by 6.0 m strip was harvested and air-dried for two weeks. The samples were double-threshed and the seed cleaned before weighing.

The results in the table below indicate that red clover established by activated carbon seeding has excellent tolerance to 2.0 kg/ha of diuron, but 4.0 kg/ha caused a 54% reduction in seed yield compared to the check. These initial experiments suggest that the activated carbon seeding may reduce varietal and alfalfa contamination to acceptable tolerances or to a level where hand-roguing would be feasible. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

First year red clover seed yields

Diuron (kg/ha)	Seed yield (kg/ha)
0.0	487
2.0	575
4.0	226
$LSD_{0.05}$	106

Control of barnyardgrass in grain sorghum under sprinkler irrigation. Hill, J.E. and L. Smith. Barnyardgrass is a troublesome weed in grain sorghum. A study was initiated on the experimental farm of the University of California at Davis to test the effectiveness of ten herbicides for the control of barnyardgrass in grain sorghum. The test site was preseeded to barnyardgrass and flat planted to grain sorghum on 30 inch rows May 20, 1976. Herbicides were applied to the soil surface on 10 ft by 15 ft plots with a constant pressure CO_2 sprayer at 40 gpa and 30 psi, May 22, 1976. The plot was sprinkler irrigated with 2 to 3 inches of water 30 hours following the herbicide application.

Stand counts, barnyardgrass control and crop phytotoxicity were evaluated July 12, 1976. Good barnyardgrass control, acceptable stand and low crop phytotoxicity were found with 8 lbs/A of propachlor and R-37878. Good barnyardgrass control but unacceptable injury was obtained with HOE 23408 and VEL 5052. The 30-hour delay in irrigation may have resulted in volatilization of butralin from the soil surface.

Grain sorghum is grown under many irrigation regimes in California. These results indicate that acceptable barnyardgrass control may be obtained in grain sorghum germinated under sprinklers. With increased number of sprinkler lines available, sprinkling for grain sorghum germination with the use of herbicides for barnyardgrass control may increase. (University of California, Botany Department, Davis, CA 95616).

Control of barnyardgrass in grain sorghum under sprinkler irrigation

Herbicide	Rate lb/A	7/12/76[1/] barnyardgrass[2/] control	7/12/76[1/] phytotoxicity[2/]	Sorghum plants per meter row
propachlor	4	5.0	0	19.0 a
propachlor	8	9.5	0	13.3 cd
HOE 23408	1	7.0	2.0	5.0 ef
HOE 23408	4	9.1	5.3	1.7 fg
GCP 6137	2	1.0	0	15.9 a-c
GCP 6137	4	1.3	0.3	18.5 a
bifenox	1	0.3	0	17.7 ab
bifenox	2	0	0.3	15.5 a-d
R-37878	4	5.7	0.3	14.9 a-d
R-37878	8	9.0	1.3	13.7 b-d
Dowco 356	2	4.0	0	15.8 a-c
Dowco 356	4	5.0	0.3	15.3 a-d
VEL 5052	2	7.7	2.0	7.0 e
VEL 5052	4	9.5	7.3	0.5 g
perfluidone	2	0.7	0	16.2 a-c
perfluidone	4	5.0	1.3	11.4 d
M-3432	3	0.3	0	15.1 a-d
M-3432	6	0.7	0.3	14.3 b-d
butralin	1	1.7	0.3	16.5 a-c
control	-	0.3	0	16.6 a-c

1/ 0 = no control or phytotoxicity, 10 = complete control or complete kill of sorghum

2/ Average of three replications

Barnyardgrass control in grain sorghum with preplant incorporated and preemergence herbicide applications. Orr, J.P., L. Lorentzen and D. Martella. The herbicides listed in the following table were applied preplant incorporated on 6/30/76, except for bifenox which was applied preemergence surface 7/2/76. Applications were made at Cosumnes Junior College on a clay loam soil with 0.6% organic matter, 31.6% sand, and 28.6% silt, and 39.8% clay.

All herbicides were applied with a single nozzle CO_2 spraying unit in a total volume of 50 gpa water. The plots were two beds, 30 inch row spacing by 20 ft, randomized with three replications. Treatments were incorporated to a depth of one inch by means of a power tiller with L-shaped knives. The plot was furrow irrigated.

The majority of the preplant incorporated treatments gave good to excellent control of barnyardgrass. Dowco 356 and M-3432 exhibited severe stand reduction and shrinking at 2 and 4 lb/A.

R-37878 at 2, 4 and 6 lb/A; bifenox at 2, 4 and 6 lb/A, and propachlor at 6 lb/A were about equal in performance at equivalent rates giving good to excellent barnyardgrass control with none to slight phytotoxicity by the propachlor. Hercules 26910 at 2 lb/A gave good barnyardgrass control with slight stand and vigor reduction. Bifenox applied preemergence surface gave no control of barnyardgrass. (Cooperative Extension, University of California, Sacramento, CA 95813).

Barnyardgrass control in grain sorghum with preplant incorporated and preemergence herbicide applications

Treatment[1/]	Rate lb/A	Barnyardgrass control[2/]	Grain sorghum stand reduction[2/]	Vigor reduction
R-37878 6E	2.0	8.8	0.6	0
R-37878	4.0	9.1	0	0
R-37878	6.0	9.3	0	0
bifenox 80W	2.0	8.1	0	0
bifenox	4.0	8.6	0	0
bifenox	6.0	9.3	0	0
propachlor 65W	4.0	3.0	0	0
propachlor	6.0	10.0	0.6	1.6
Hercules 26910 4E	0.5	7.0	0	0
Hercules 26910	2.0	8.8	1.0	1.0
GCP 6137 1E	2.0	10.0	1.6	1.3
GCP 6137	4.0	6.5	0	0
M-3432 70%	2.0	7.8	6.0	3.0
M3432	4.0	8.5	7.6	6.0
Dowco 356 4E	2.0	10.0	9.3	7.3
Dowco 356	4.0	10.0	10.0	10.0
Control	-	0	0	0
bifenox[3/] 80W	1.0	0	0	0
bifenox	2.0	0	0	0
bifenox	4.0	0	0	0

[1/] Treated 7/2/76

[2/] Readings 7/21/76

[3/] Preemergence surface

Herbicide combinations in sugarbeets. Arle, H.F. and K.C. Hamilton. Evaluation of herbicide combinations in sugarbeets (var. USH9B) planted on beds 30 inches apart was continued at Mesa, Arizona. Barley, mustard, and junglerice seeds were disked into the soil (sand 40%, silt 40%, clay 20%, organic matter 1%) before herbicides were applied. Other weeds in the area were tumble pigweed, Palmer amaranth, purslane, hyssop spurge, Wright groundcherry, and spiny sowthistle. On September 17, 1975, preplanting herbicides were applied to the soil and disked in before furrowing (PPC) or incorporated only by furrowing (PP). Planting sugarbeet seed in dry soil was followed by germination irrigations in alternate furrows. On October 19, 1975, postemergence herbicides were applied over the top of sugarbeets (1 to 4 inches high) and weeds (1 to 6 inches high). Herbicides were applied in 40 gpa of water. Treatments were replicated four times on five-row plots 30 ft long. The test was cultivated five times and tops of weeds were removed three times with a stalk chopper. Development of sugarbeets and weeds were observed every few weeks and sugarbeets were harvested in June, 1976. Samples were obtained for sucrose analysis.

All preplanting applications of herbicides injured sugarbeets. EPTC caused the most injury (see table). All herbicide combinations controlled broadleaf weeds and gave 70 to 90% control of grass weeds during the early growing season. The best season-long weed control was with the combination of ethofumesate, phenmedipham, and pronamide. There was no difference in weed control or crop response when ethofumesate or cycloate were incorporated by disking and furrowing or furrowing only. There was no difference in beet yield or sucrose content between herbicide treatments. (Plant Sciences Dept., Univ. of Arizona, Tucson, AZ 85721).

Response of weeds and sugarbeets to herbicide combinations at Mesa, Arizona

Method	Treatments: Preplant Herbicide[2/]	Preplant lb/A	Postemergence Herbicide	Postemergence lb/A	Percent weed control and crop injury estimated 10/29/75: Broadleaf	Grass	Sugar beets	Yield of beets[1/] ton/A
	Cultivated check				0	0	0	9 b
PPD	ethofumesate	1	phenmedipham and pyrazon	1 3	98	70	25	36 a
PP	ethofumesate	1	phenmedipham and pyrazon	1 3	100	75	25	39 a
PPD	ethofumesate	1	phenmedipham and pronamide	1 1	100	85	25	42 a
PPD	cycloate	1	phenmedipham and pyrazon	1 3	100	75	10	35 a
PP	cycloate	1	phenmedipham and pyrazon	1 3	99	89	5	35 a
PPD	EPTC	2	phenmedipham and pyrazon	1 3	100	92	65	35 a
PPD	pebulate	2	phenmedipham and pyrazon	1 3	100	90	32	37 a
PPD	H22234	2	phenmedipham and pyrazon	1 3	98	85	25	34 a

1/ Values followed by the same letter are not significantly different at the 5% level

2/ PPD - Preplant disked in before furrowing
PP - Preplant, incorporated only by furrowing

Postemergence weed control in sugarbeets in northern Wyoming. Humburg, N.E., H.P. Alley and A.F. Gale. Evaluations of postemergence applications of herbicides for weed control in sugarbeets were conducted on plots established at the Powell Agricultural Substation. The soil was a clay loam of 33.2% sand, 28.4% silt, and 38.4% clay, with an organic matter content of 1.1% and pH 7.5. Plots were bedded and sugarbeet seed was planted in 22-inch rows on May 5, 1976.

Herbicides were applied May 27, 1976, with a hand-carried knapsack sprayer; the herbicide-water solutions were sprayed full coverage at 40 gpa. Sugarbeets were in two to four-leaf stage of growth. The air temperature was 78 F, relative humidity was 24% and wind velocity was 3 to 8 mph. Treatments were replicated three times.

Evaluations of weed control and herbicidal injury to sugarbeets were made June 8, 1976, by comparing plant counts obtained from treated areas to those from untreated check plots. Counts were from two areas per plot, using a 3 inches by 10 ft quadrat centered on the sugarbeet row. Common lambsquarter, wild buckwheat, and green foxtail were the principal weed species.

All herbicide treatments provided control of common lambsquarter at 85 to 99% effectiveness with the exception of the lowest application rate of HOE-23408 + desmedipham at 0.5 + 0.5 lb/A which gave 65% control, and HOE-23408 at 1.0 and 1.5 lb/A which gave no control. Ethofumesate + phenmedipham at 1.0 + 0.75 lb/A and 1.0 + 1.0 lb/A as well as ethofumesate + desmedipham at 1.0 + 0.75 lb/A and 1.0 + 1.0 lb/A provided 100% control of wild buckwheat, but sugarbeet stands were reduced significantly by the four treatments. HOE-23408 at 1.0 and 1.5 lb/A resulted in 100% control of green foxtail, but gave no control of common lambsquarter and wild buckwheat; these treatments did not injure sugarbeets and reductions of stands were not significant. Four other herbicide treatments, ethofumesate + phenmedipham at 1.0 + 0.75 lb/A and 1.0 + 1.0 lb/A, HOE-23408 + desmedipham at 1.0 + 1.0 lb/A, and HOE-23408 + phenmedipham + desmedipham at 1.5 + 0.5 + 0.5 lb/A also provided 100% control of green foxtail. (Wyoming Agric. Exp. Sta., Laramie, SR-773).

Effect of postemergence herbicides on sugarbeet stand, sugarbeet injury and weed control at Powell, Wyoming

Treatment	Rate lb/a	Sugarbeets Stand %	Sugarbeets Injury[1] 0-100	Percent control[2] LQ	WB	GF
ethofumesate + phenmedipham	1.0 + 0.75	61 b-d[3]	60 ab	99	100	100
ethofumesate + phenmedipham	1.0 + 1.0	33 e	67 a	93	100	100
ethofumesate + desmedipham	1.0 + 0.75	62 b-d	53 a-c	96	100	75
ethofumesate + desmedipham	1.0 + 1.0	60 cd	67 a	99	100	84
ethofumesate + phenmedipham	0.5 + 1.0	60 cd	53 a-c	94	95	94
ethofumesate + desmedipham	0.5 + 1.0	78 a-d	40 b-d	93	95	83
phenmedipham	1.0	75 a-d	67 a	93	96	83
desmedipham	1.0	63 b-d	53 a-c	97	82	78
dinitramine + desmedipham	0.33 + 1.0	83 a-c	40 b-d	91	79	33
HOE-23408 + desmedipham	1.0 + 1.0	73 a-d	40 b-d	85	78	100
HOE-23408 + desmedipham	0.5 + 0.5	92 a	27 d	65	50	64
HOE-23408 + desmedipham	0.75 + 0.75	82 a-c	47 a-d	88	87	72
HOE-23408 + desmedipham	1.5 + 1.0	58 c-e	47 a-d	89	83	81
HOE-23408	1.0	83 a-c	0 e	0	0	100
HOE-23408	1.5	92 a	0 e	0	0	100
HOE-23408 + phenmedipham + desmedipham	1.0 + 0.5 + 0.5	54 de	60 ab	94	97	94
HOE-23408 + phenmedipham + desmedipham	1.5 + 0.5 + 0.5	52 de	60 ab	96	96	100
phenmedipham (Na014)[4]	1.0	89 ab	33 cd	90	94	67
phenmedipham + X-77[4]	1.0	73 a-d	33 cd	97	96	76
desmedipham (Na016)[4]	1.0	92 a	47 a-d	86	83	68
desmedipham + X-77[4]	1.0	77 a-d		88	95	47
Check	-	100 a		0	0	0
C.V.		19.2%	25.4%			

[1]Injury as visual rating of foliar damage: 0 = no injury, 100 = complete kill

[2]Abbreviations denote: LQ = common lambsquarter; WB = wild buckwheat; GF = green foxtail

[3]Means with the same letter(s) within the same column are not significantly different at the 5% level

[4]Surfactants Na014 and Na016 included with herbicides. Surfactant X-77 applied at 1 pt/100 gal solution

Postemergence weed control in sugarbeets in eastern Wyoming. Humburg, N.E., H.P. Alley and A.F. Gale. A study to evaluate postemergence-applied herbicides in furrow-irrigated sugarbeets at the Torrington Agricultural Substation was established April 21, 1976. Pelleted sugarbeet seed was planted in 22-inch rows on beds. The experiment was conducted on loamy sand soil (78.3% sand, 20.3% silt and 1.4% clay) with a pH of 7.2 and organic matter content of 0.9%.

Postemergence applications of herbicides were made on May 25, with sequential applications on June 2. Treatments were replicated three times. Herbicides were applied full coverage with a hand-carried knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa water solution. The temperature was 70 F and relative humidity was 50% on May 25; sugarbeets were in full two-leaf stage. The temperature on June 2 was 76 F and sugarbeets were in the four and six-leaf stages of growth.

Herbicide assessment was by plant counts from two areas per plot, each 10 ft by 3 inches, 1.5 inches on either side of the sugarbeet row. Sugarbeet stand and weed control of treated plots were expressed as percentages of counts from untreated check plots. There were no significant differences in sugarbeet stands among the treatments.

The predominant weed species were common lambsquarter, redroom pigweed, black nightshade and green foxtail. Control of broadleaved weeds by ethofumesate + desmedipham at 1.0 + 1.0 lb/A and 0.5 + 1.0 lb/A was outstanding, control of green foxtail was not total but the treatments were among the best in the trials. Desmedipham generally performed better than phenmedipham for controlling broadleaved weeds where applied in combination with other herbicides. Seven treatments provided 100% control of black nightshade, whereas two treatments gave 100% control of common lambsquarter and one treatment gave complete control of redroot pigweed. Control of green foxtail ranged from 11 to 89%. Phenmedipham generally was more effective than desmedipham for controlling green foxtail. (Wyoming Agric. Exp. Sta., Laramie, SR-772).

Effect of postemergence treatments on sugarbeet stand and weed control at Torrington, Wyoming

Treatment	Rate lb/A	Sugarbeet stand %	Percent control[1/] LQ	PW	NS	GF
ethofumesate + phenmedipham	1.0 + 0.75	98 a	63	9	79	74
ethofumesate + phenmedipham	1.0 + 1.0	96 a	93	31	58	78
ethofumesate + desmedipham	1.0 + 0.75	99 a	45	73	65	52
ethofumesate + desmedipham	1.0 + 1.0	100 a	100	100	100	87
ethofumesate + phenmedipham	0.5 + 1.0	94 a	94	24	76	84
ethofumesate + desmedipham	0.5 + 1.0	95 a	100	99	100	69
phenmedipham	1.0	97 a	83	0	100	71
desmedipham	1.0	97 a	50	82	58	23
dinitramine + desmedipham	0.33 + 1.0	95 a	57	81	71	52
HOE-23408 + desmedipham	1.0 + 1.0	94 a	56	72	91	66
HOE-23408 + desmedipham	0.5 + 0.5	99 a	46	52	83	40
HOE-23408 + desmedipham	0.75 + 0.75	100 a	78	90	100	71
HOE-23408 + desmedipham	1.5 + 1.0	100 a	60	89	100	52
HOE-23408	1.0	92 a	25	0	18	26
HOE-23408	1.5	92 a	33	33	63	42
HOE-23408 + phenmedipham + desmedipham	1.0 + 0.5 + 0.5	98 a	82	30	96	79
HOE-23408 + phenmedipham desmedipham	1.5 + 0.5 + 0.5	97 a	95	37	100	86
phenmedipham (Na014)[3/]	1.0	95 a	82	0	92	79
phenmedipham + X-77[3/]	1.0	98 a	67	0	97	89
desmedipham (Na016)[3/]	1.0	97 a	64	75	63	28
desmedipham + X-77[3/]	1.0	97 a	68	64	100	20
phenmedipham (Sequence)[4/]	1.0	98 a	87	0	88	63
desmedipham (Sequence)	0.75	99 a	57	65	44	11
phenmedipham + desmedipham (Sequence)	0.38 + 0.38	95 a	37	14	90	37
Check	-	100 a	0	0	0	0
C.V.		4.9%	43.7%	55.8%	35.3%	36.2%

[1/]Abbreviations denote: LQ = common lambsquarter; PW = redroot pigweed; NS - black nightshade; GR = green foxtail

[2/]Means with the same letter(s) within the same column are not significantly different at the 5% level

[3/]Surfactants Na014 and Na016 included with herbicides. Surfactant X-77 applied at 1 pt/100 gal solution

[4/]Sequential treatments: herbicides applied at same rate eight days after first treatment

Preplant-postemergence complementary herbicide treatments for weed control in sugarbeets. Humburg, N.E., H.P. Alley and A.F. Gale. The effectiveness of preplant-postemergence complementary herbicide treatments was studied at the Powell Agricultural Substation. Soil at the research site was clay loam (33.2% sand, 28.4% silt and 38.4% clay) with 1.1% organic matter and 7.5 pH.

The field was prebedded for 22-inch rows. Preplant application of herbicides with power incorporation and planting of pelleted sugarbeet seed occurred in one operation on May 4, 1976. Preplant herbicides were applied in a 7-inch band with 34.5 gpa water carrier on a total area basis. Treatments were replicated three times. Postemergence treatments were made on may 27, 1976; relative humidity was 15% and air temperature was 75 F with a wind velocity of 3 to 8 mph. Sugarbeet development on May 27 was two to four leaves.

Counts of sugarbeets and weeds were made on June 9, 1976, from two row-centered 3 inches by 10 ft quadrat locations per plot. Sugarbeet stands on plots receiving preplant applications of ethofumesate or cycloate, with postemergence applications of phenmedipham and/or desmedipham, were reduced significantly. Plots receiving postemergence applications of phenmedipham at 1.0 lb/A or desmedipham at 1.0 lb/A and preplant applications of H-22234 + ethofumesate at 1.5 + 1.5 lb/A or H-22234 + pyrazon at 3.0 + 2.0 lb/A had sugarbeet stands that were not significantly different from that of check plots. Treatments that did not affect sugarbeet stands provided control of common lambsquarter that ranged from 83 to 93%. Five of the 10 treatments that significantly reduced sugarbeet stands resulted in 100% control of common lambsquarter; the control of wild buckwheat by these five treatments ranged from 93 to 98%. (Wyoming Agric. Exp. Sta., Laramie, SR-774).

Effect of complementary preplant-postemergence treatments on sugarbeet stand and weed control at Powell, Wyoming

Treatments	Rate lb/A	Sugarbeet stand %	Percent control: Common lambs-quarter	Percent control: Wild buckwheat
ethofumesate +	3.0			
ethofumesate + phenmedipham	1.0 + 0.75	62 b[1/]	100	97
ethofumesate + phenmedipham	1.0 + 1.0	42 b-e	100	93
ethofumesate + desmedipham	1.0 + 0.75	58 b-e	100	96
ethofumesate + desmedipham	1.0 + 1.0	49 b-e	100	95
ethofumesate + phenmedipham + desmedipham	1.0 + 0.5 + 0.5	39 de	98	96
cycloate +	3.0			
ethofumesate + phenmedipham	1.0 + 0.75	58 b-d	98	96
ethofumesate + phenmedipham	1.0 + 1.0	51 b-e	100	98
ethofumesate + desmedipham	1.0 + 0.75	61 bc	100	98
ethofumesate + desmedipham	1.0 + 1.0	40 c-e	98	94
ethofumesate + phenmedipham + desmedipham	1.0 + 0.5 + 0.5	31 e	100	97
H-22234 + ethofumesate +	1.5 + 1.5 +			
phenmedipham	1.0	95 a	94	93
desmedipham	1.0	94 a	97	83
H-22234 + pyrazon +	3.0 + 3.0 +			
phenmedipham	1.0	100 a	92	90
desmedipham	1.0	100 a	84	89
Check	---	100 a	0	0
C.V.		17.4%		

[1/] Means with the same letter(s) within the same column are not significantly different at the 5% level.

Preplant weed control in sugarbeets under sprinkler irrigation. Humburg, N.E., H.P. Alley and A.F. Gale. The study was established at the Torrington Agricultural Substation to determine the effectiveness of preplant applications of herbicides for weed control in sprinkler irrigated sugarbeets. The soil was classified as loamy sand with 76.0% sand, 20.8% silt, 3.2% clay, 0.8% organic matter and 6.7 pH. Herbicides were applied in a 7-inch band on 22-inch bedded rows with 34.5 gpa water carrier on a total area basis. Treatments were replicated three times. Application, incorporation, and planting of Holly HH-21 seed at three per linear ft were accomplished in one operation on April 21, 1976. One-half inch of irrigation water was applied within 48 hours after planting and precipitation totalling 0.54 inches occurred within one week.

Sugarbeet stand counts, visual ratings of foliar injury, and weed counts were made on June 1, 1976, from two row-centered 3 inches by 10 ft quadrat locations per plot. The weed population consisted of kochia, common lambsquarter, redroot pigweed, and green foxtail.

Eleven treatments resulted in 90% or better control of common lambsquarter, whereas three treatments provided 90% or better control of redroot pigweed. Ethofumesate (EC) at 2.5 lb/A and R-37878 + cycloate at 3.0 + 2.0 lb/A gave 100% control of common lambsquarter. Ethofumesate + cycloate at 2.5 + 2.5 lb/A resulted in 100% control of kochia and green foxtail; however, this treatment was one of five that significantly reduced the sugarbeet stand. Green foxtail was controlled by each herbicide or herbicide combination at 86% or greater. Five of the 21 herbicide treatments gave 100% control of green foxtail. (Wyoming Agric. Exp. Sta., Laramie, SR-771).

Effect of preplant treatments on sugarbeet stand, injury and weed control, Torrington, Wyoming

Treatment	Rate lb/A	Sugarbeets Stand %	Sugarbeets Injury[1/] 0-100	Percent control[2/] KO	LQ	PW	GF
ethofumesate + cycloate	1.5 + 1.5	78 b-d[3/]	63 a-c	25	97	89	100
ethofumesate + cycloate	2.0 + 3.0	75 cd	70 a-c	83	78	89	96
ethofumesate + cycloate	2.5 + 2.5	77 b-d	83 ab	100	84	90	100
ethofumesate + H-22234	1.5 + 1.5	88 a-d	43 c	33	93	70	96
ethofumesate + H-22234	2.0 + 2.0	90 a-c	60 a-c	33	78	44	100
ethofumesate + H-22234	2.0 + 3.0	85 a-d	67 a-c	22	94	84	98
ethofumesate + H-22234	3.0 + 3.0	100 a	50 bc	33	77	76	95
pyrazone + H-22234	3.0 + 2.0	98 ab	40 c	53	87	93	94
ethofumesate + pyrazon	1.5 + 2.0	83 a-d	57 a-c	39	97	89	98
ethofumesate + pyrazon	2.0 + 2.0	89 a-d	47 c	33	90	95	96
ethofumesate + HOE-23408	1.5 + 1.5	98 ab	50 bc	25	97	71	100
ethofumesate + HOE-23408	2.0 + 1.5	92 a-c	60 a-c	36	80	73	100
ethofumesate + HOE-23408	2.0 + 2.0	94 a-c	43 c	50	93	78	98
ethofumesate + HOE-23408	3.0 + 2.0	76 b-d	47 c	78	67	68	90
ethofumesate (EC)	2.5	98 ab	50 bc	61	100	57	96
ethofumesate (EC)	3.5	80 a-d	63 a-c	69	94	67	96
ethofumesate (Fl)	2.5	97 a-c	63 a-c	44	90	71	94
ethofumesate (Fl)	3.5	94 a-c	47 c	44	87	89	95
R-37878	3.0	98 ab	50 bc	14	60	51	86
R-37878	6.0	96 a-c	60 a-c	75	78	37	89
R-37878 + cycloate	3.0 + 2.0	68 d	90 a	25	100	73	98
Check	-	100 a	0 d	0	0	0	0
C.V.		12.4%	33.1%	77.8%	22.1%	37.3%	7.4%

[1/] Visual ratings of foliar damage: 0 = no injury, 100 = complete kill

[2/] Abbreviations denote: KO = kochia, LQ = common lambsquarter, PQ = redroot pigweed, GF = green foxtail

[3/] Means with the same letter(s) within the same column are not significantly different at the 5% level

Postemergence herbicide screening trial in sugarbeets. Norris, R.F. and R.A. Lardelli. Postemergence weed control, especially of grasses, in spring sown sugarbeets in the Sacramento Valley is often unsatisfactory. A trial was established to evaluate existing and newly developed herbicides for their potential under late spring conditions.

The experiment was conducted on a sandy loam soil, pH 7.5 and 1.2% organic matter, on the Agronomy farm at Davis. Plot size was 2 beds by 20 ft. Treatments were replicated four times. Herbicides were applied using a backpack CO_2 handsprayer, with 8003E nozzles delivering 40 gal/A. Treatment dates, conditions, and growth stages are indicated below:

Early treatment, cotyledon stage sugarbeets - June 18.

Temp: low - 74 F, high 90 F
Wind calm, bright and sunny.

Late treatment, two-leaf stage sugarbeets - June 25.

Temp: low - 74 F, high 98 F
Wind 5 to 10 mph from north, bright and sunny.

A uniform stand of sugarbeets occurred in the experiment, in conjunction with a heavy barnyardgrass population, a medium stand of mixed redroot pigweed, and tumbling pigweed. The response of the sugarbeets and the weeds to the herbicides was evaluated by visual assessment of crop vigor and weed control. Weed counts were made in selected treatments in four 10 cm by 100 cm areas per plot.

Effects of treatments were evaluated on sugarbeet stand, but no consistent differences could be detected between treated plots and the untreated controls. Vigor losses were observed for several plots; in many cases this reflected competition from poorly controlled weeds rather than direct herbicide toxicity. Dalapon, the split applications of desmedipham, the 3.0 lb/A rate of ethofumesate, and the 8.0 lb/A rate of metamitron all showed low beet vigor, but all were associated with poor grass control.

HOE-23408 provided good control of barnyardgrass at 2.0 lb/A, and was superior when applied at the early growth stage. No activity against pigweed was observed. The grass control following treatment with a tank mixture of HOE-23408 and desmedipham was less than when HOE-23408 was applied alone. Applying HOE-23408 at the early treatment time and desmedipham a week later resulted in excellent activity with both compounds. The treatment of 2.0 lb/A of HOE-23408 at cotyledon stage and desmedipham at the sugarbeet two-leaf growth stage was the best in the experiment; the beets showed excellent growth and grass and broadleaved control was adequate. Ethofumesate showed almost no activity in this irrigated situation, metamitron gave some pigweed and no grass control, and BASF-9021 O H showed essentially no activity under the conditions of this experiment. Pigweed control was characteristically good with desmedipham, and poor with phenmedipham. (Botany Department, University of California, Davis, CA 95616).

Response of sugarbeets and weeds to herbicide applied postemergence (Davis, California)

Treatments: Herbicides	Treatments: Rate lb/A	Sugarbeet vigor[1]	Barnyardgrass Control[2]	Barnyardgrass Count[3]	Pigweed Control[2]	Pigweed Count[3]
phenmedipham	1.5	6.9	2.8	-	5.4	-
phenm + phenm[4]	0.75 + 0.75	7.4	2.0	-	5.1	-
desmedipham	1.0	8.3	3.1	-	9.0	-
desmedipham	1.3	7.5	1.5	59.8	10.0	1.3
desm + desm[4]	1.0 + 1.0	6.8	1.8	-	10.0	-
desm + desm[4]	0.75 + 0.75	6.3	2.6	-	10.0	-
HOE-23408	1.0	7.8	3.0	40.0	2.0	24.0
HOE-23408	2.0	7.8	7.3	15.8	4.1	-
HOE-23408 + desm	1.0 + 1.3	8.3	3.8	40.8	9.6	0.8
HOE-23408 + desm	2.0 + 1.3	7.0	3.4	35.8	7.2	11.0
HOE-23408[4]	1.0	7.9	6.6	20.8	1.9	24.5
HOE-23408[4]	2.0	8.7	9.4	12.5	2.0	17.0
HOE-23408 + desm[4]	1.0 + 1.3	8.5	8.8	14.0	9.4	3.0
HOE-23408 + desm + desm[4]	1.0 + 0.75 + 0.75	7.5	4.5	-	9.9	-
HOE-23408 + desm[4]	2.0 + 1.3	9.1	9.5	11.5	9.6	1.5
HOE-23408 + desm	1.0 + 1.0	8.1	3.3	40.5	8.4	6.3
HOE-23408 + desm	2.0 + 1.0	7.9	3.0	48.5	7.5	6.3
HOE-23408 + desm + atpluss 555	1.0 + 1.0 + 0.5%	7.8	2.9	-	6.6	-
HOE-23408 + atpluss 555	1.0 + 0.5%	7.9	5.8	58.0	5.0	15.8
ethofumesate	1.5	7.8	2.8	-	5.0	-
ethofumesate	3.0	6.9	1.0	-	4.0	-
dalapon + X-77	4.0 + 0.5%	6.3	2.8	40.0	3.3	17.0
desm + dalapon + X-77	1.0 + 4.0 + 0.5%	7.5	2.0	48.8	9.0	1.3
BASF-9021 O H	1.0	6.6	2.5	-	1.9	-
BASF-9021 O H	2.0	7.4	2.0	-	1.3	-
metamitron + Tween 20	4.0 + 0.5%	7.3	0.8	-	5.1	-
metamitron + Tween 20	8.0 + 0.5%	6.8	1.5	-	7.5	-
Untreated check		7.5	2.8	44.5	4.3	17.5

All data are means of 4 replications

1/Evaluation of ratings of 0 = all plants dead, 10 = full vigor

2/Evaluation of ratings of 0 = no weed control and 10.0 all plants were killed

3/4mx 10 cms/plot

4/First listed treatment (or first 2 treatments) applied 6/18, second (as third) treatment applied 6/25

Postemergence applications for weed control in sugarbeets. Schild, L.D. and E.E. Schweizer. Experimental herbicides, applied alone or as mixtures, were compared to phenmedipham for the control of foxtail, redroot pigweed, and kochia in sugarbeets.

The experiment was conducted on a loam soil with a pH of 7.8 and an organic matter of 2.1%. Herbicide treatments were replicated three times. The herbicides were sprayed in water on an 11-inch band on May 27 at a broadcast volume of 30 gpa. Stages of growth at application were: sugarbeets four-true leaves; foxtail species four to five leaves, 20 to 30 mm in ht; redroot pigweed three to five leaves, 10 to 30 mm in ht; and kochia 10 to 25 mm in ht, with a diameter of 15 to 40 mm.

The response of weeds and sugarbeets to the herbicides was determined by counting the number of weeds and by visually assessing crop vigor. Weeds were counted in four quadrats, each 5½ inches by 10 ft, per treatment. The stand of weeds in the treated plots has been expressed as a percentage of those weeds present in the untreated check plots.

The herbicides reduced the stand of sugarbeets 6% or less. The mixture of HOE-23408 plus SN 503 controlled foxtail the best (see table). Redroot pigweed was controlled 80% or more by seven treatments, with metamitron plus surfactant Tween 20 or Emulsifier OX controlling 92% of this species. Although none of the herbicide treatments controlled kochia satsifactorily, the mixture of ethofumesate plus SN 503 was the best. Based on the visual weed control ratings, three mixtures that included SN 503 controlled more weeds than did phenmedipham. These mixtures were ethofumesate plus SN 503, HOE-23408 plus SN 503, and ethofumesate plus pyrazon plus SN 503. Further evaluations of these mixtures are warranted. (Western Region, Agricultural Research Service, U.S. Department of Agriculture, Fort Collins, CO 80523).

Response of sugarbeets and weeds to herbicides applied postemergence
(Fort Collins, Colorado)

Herbicide	Rate lb/A	Sugarbeet tolerance rating[1]	Weed control[1] Stand reduction Foxtail	Redroot pigweed	Kochia	Avg	Control rating
		(%)		(%)			(%)
desmidipham	3/4	7	11	82	44	44	42
phenmedipham	1	3	47	7	43	32	45
desmedipham (Na016)	3/4	8	19	86	40	48	50
phenmedipham (Na014)	1	7	38	5	28	24	53
ethofumesate + SN 503[2]	1-1/2 + 3/4	45	39	82	54	58	77
HOE-23408 + SN 503	1 + 1	13	60	64	48	57	75
dinitramine + SN 503	3/8 + 3/4	15	31	80	47	53	62
dinitramine solvent + SN 503	3/8 + 3/4	0	16	66	27	36	42
metamitron	4	0	20	61	6	29	8
metamitron + Tween 20	4	13	14	92	18	41	37
metamitron + Emulsifier OX	4	5	18	92	25	45	33
SN 503 + ethofumesate + pyrazon + 2.5% desmedipham solvent	3/4 + 1 + 1 + 2.5%	20	28	86	49	54	77

[1] Evaluations - June 10. Ratings of 0 = no sugarbeet injury or weed control, 100 = all plants were killed

[2] SN 503 = equal rates of desmedipham + phenmedipham

Preplant and preemergence applications for weed control in sugarbeets. Schild, L.D. and E.E. Schweizer. Experimental herbicides, applied alone or as mixtures, were compared to ethofumesate for the control of foxtail, redroot pigweed, and kochia in sugarbeets.

The experiment was conducted on a loam soil with a pH of 7.8 and an organic matter of 2.1%. Herbicide treatments were replicated four times. On April 12, the herbicides were sprayed broadcast with water at a volume of 40 gpa. The preplanting treatments were incorporated 1½ inches deep with a rolling cultivator and the preemergence treatment (R 37878) was applied broadcast immediately after planting. Sugarbeet seeds 'GW Mono-Hy D2' were planted immediately following the herbicide applications at three seeds per foot of row. On April 24, 0185 inches of water from sprinkler irrigation and 1.06 inches of nature precipitation on April 27 promoted germination.

The response of sugarbeets and weeds to the herbicides was determined by counting the number of plants and by visually assessing crop vigor. Weeds and sugarbeets were counted in four quadrates, each 5½ inches by 10 ft, per treatment. The stand of weeds and sugarbeets in the treated plots is expressed as a percentage of those species present in the untreated check plots.

The stand of sugarbeets was reduced 3 to 26%, depending on the herbicide treatment (see table). The foliar growth of sugarbeets was suppressed most by the mixture of cycloate and ethofumesate.

Foxtail species were controlled 90% or more by six treatments, with the mixtures of R 37878 plus ethofumesate and cycloate plus ethofumesate controlling 99% of the foxtail population (see table). Redroot pigweed was controlled 90% or more by five treatments, with metamitron and mixtures of metamitron controlling this species similar to that of ethofumesate. Kochia was not controlled satisfactorily with any herbicide. With respect to sugarbeet tolerance and weed control, none of the new herbicides controlled foxtail or redroot pigweed better than did ethofumesate. (Western Region, Agricultural Research Service, U.S. Department of Agriculture, Fort Collins, CO 80523).

Response of sugarbeets and weeds to herbicides applied preplanting and preemergence
(Fort Collins, Colorado)

Treatments		Sugarbeets 1/		Weed stand reduction 1/			
Herbicide	Rate lb/A	Stand reduction	Injury rating	Foxtail	Redroot pigweed	Kochia	Avg
		(%)			(%)		
R 37878 2/	2.0	10	36	43	32	23	33
R 37878 2/	3.0	12	56	54	54	41	50
R 37878 + ethofumesate	1.0 + 2.0	10	46	95	84	38	72
R 37878 + ethofumesate	2.0 + 2.0	14	63	99	85	34	73
cycloate + ethofumesate	2.5 + 2.5	26	75	99	95	66	87
metamitron	4.0	9	24	22	91	7	40
metamitron	6.0	8	16	46	93	30	56
metamitron + cycloate	3.0 + 3.0	14	36	90	72	35	66
metamitron + HOE-23408	4.0 + 1.5	15	21	95	93	23	70
ethofumesate	2.0	3.0	43	95	95	44	78

1/ Evaluations - May 26. Rating of 0 = no sugarbeet injury or weed control, 100 = all plants were killed

2/ Applied preemergence

Preplant ethofumesate formulations and mixtures on sugarbeets, 1976. Sullivan, Edward F. and Lee O. Britt. Preplant evaluations of ethofumesate (Nortron) emulsifiable concentrate and flowable formulations alone and in mixtures on sugarbeets were made at Longmont, Colorado. Spray delivery was 14.1 gpa in a 7 inch band. Logarithmic plots were 100 ft long by two rows at 22 inch spacing. The half-dosage distance measured 23.5 ft. Fixed dosage plots were 6 rows by 25 ft. Soil moisture was satisfactory for germination and chemical activity. Longmont location received 2.07 inches of precipitation, and 5 inches of surface-irrigation within five weeks after establishment (March 28-May 1). The seedbed surface (clay loam) was cloddy, firm, and dry. The subsoil was wet. Great Western Mono Hy D_2 beet seed was sown at 4 seeds per ft at the 1 inch depth. Herbicides were soil-incorporated at the 1.5 inch depth at planting (April 1 to 9). A hooded, power-tine tiller was used. Major weeds in the untreated controls were redroot pigweed, kochia, and foxtails. Minor weeds were common lambsquarters, wild buckwheat, and shepherdspurse. Plant counts were taken on May 25 to 27 within a 3 inch by 48 inch quadrat at a place in the row estimated by the observer to have the highest percentage weed control with the least crop injury (log optimal response) and at a randomly designated position in the four innermost rows on fixed dosage plots. Results were analyzed statistically by computer, and average data for selected treatments are reported herein as percentages of the untreated controls (Tables 1 and 2). (Contribution of The Great Western Sugar Company, Agricultural Research Center, Longmont, Colorado. Published with the approval of the Director as Abstract No. 21-H Journal Series.)

Table 1 Effect of preplant ethofumesate formulations on sugarbeets and weeds at Longmont, Colorado, spring, 1976 (experiment 227, 4 replications) (Sullivan and Britt)

Treatments	Fixed dose lb/A	Beets Injury	Beets Stand	Weeds Rrpw	Weeds Ko	Weeds O	Weeds Bl	Weeds Gr	Weeds Tot
			(Scores and seedling counts as % of controls)						
ethofumesate (EC)	1.0	14	105	99	72	53	82	80	81
ethofumesate (EC)	2.0	16	112	100	89	75	92	96	94
ethofumesate (EC)	3.0	19	105	100	94	88	96	96	96
ethofumesate (EC) + Tween 20	3.75 + 0.5%	41	100	100	98	90	97	97	97
ethofumesate (F)	1.0	11	101	72	63	58	67	58	63
ethofumesate (F)	2.0	30	106	100	90	84	94	97	95
ethofumesate (F)	3.0	34	96	100	100	86	97	98	97
ethofumesate (F) + Tween 20	3.75 + 0.5%	30	99	100	93	93	96	98	97
Plant count (sq ft)			2.9	13.1	6.2	5.0	24.3	19.8	44.1

Remarks: Tot (total weed control); Bl (total broadleaf control); Gr (foxtail spp control); Rrpw (redroot pigweed); Ko (kochia); and O (other broadleaf weed control)

Table 2 Effect of preplant Nortron formulation mixtures on sugarbeets and weeds at Longmont, Colorado, spring, 1976 (experiment 203, 2 replications, average 2 trials) (Sullivan and Britt)

Treatments	Max dose lb/A	Opt dose lb/A	Beets Injury	Beets Stand	Weeds Rrpw	Weeds Ko	Weeds O	Weeds Bl	Weeds Gr	Weeds Tot
			(Scores and seedling counts as % of controls)							
ethofumesate (EC) + cycloate	12.0 + 8.0	1.5 + 1.0	14	86	100	87	87	93	99	97
ethofumesate (F) + cycloate	12.0 + 8.0	1.8 + 1.1	14	102	100	74	86	89	98	94
ethofumesate (EC) + HOE-23408	8.0 + 8.0	2.0 + 2.0	9	116	100	77	60	82	100	92
ethofumesate (F) + HOE-23408	8.0 + 8.0	2.0 + 2.0	10	99	99	87	87	91	100	96
ethofumesate (EC) + endothall 283	12.0 + 8.0	2.9 + 2.0	14	100	100	93	86	94	97	95
ethofumesate (F) + endothall 283	12.0 + 8.0	2.9 + 2.0	11	99	99	89	69	88	95	92
ethofumesate (EC) + H-22234	8.0 + 8.0	1.6 + 1.6	11	93	93	89	82	88	98	94
ethofumesate (F) + H-22234	8.0 + 8.0	1.8 + 1.8	5	100	100	81	88	91	99	96
ethofumesate (EC) + pyrazon	8.0 + 8.0	1.4 + 1.4	11	100	100	81	92	93	94	94
ethofumesate (F) + pyrazon	8.0 + 8.0	1.6 + 1.6	9	100	100	93	94	96	98	98
Plant counts (sq ft)				3.1	10.6	6.0	7.3	23.9	32.0	55.9

Remarks: See table 1 for weed symbol designations

Herbicide combinations for weed control in fallow systems 1976. Alley, H.P. and N.E. Humburg. The treatments were applied 4/13/76, to already established weed species. The downy brome had 1/2 to 1-1/2 inch leaf height with four to six leaves and tansy mustard had 1/2 to 1 inch leaf growth at time of treatment. Plots were one sq rd in size with a complete block experimental design randomized with three replications. The soil at the experimental site (Archer Agricultural Substation) was classified as sandy loam - 66.8% sand, 21.6% silt, 11.6% clay and 0.49% organic matter with a 6.0 pH. All treatments were applied with a knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa total volume of water carrier.

The weed population consisted of downy brome, tansy mustard, and Russian thistle as recorded at the time of visual evaluations.

The VEL-5026 80W formulation would not go into suspension, being especially bad at the higher rates of application. Cyanazine + atrazine as a tank mix "beaded" and formed "globules" and was not a compatible mixture.

Cyanazine 4WDS + paraquat + X-77 at 2.4 + 0.5 lb/A, cyanazine + atrazine + X-77 (Pre-Mix) at 2 lb/A formulation, cyanazine + atrazine + paraquat + X-77 (Tank Mix) at 2 + 1 + 0.25 lb/A formulation appeared to be the outstanding combination treatments, resulting in 96 to 100% control of the three weed species recorded. Five other combinations gave 90% or better control but exhibited a weakness toward one of the three weed species. (Wyoming Agric. Exp. Sta., Laramie, SR 761).

Percentage annual broadleaf and grass control in a wheat fallow program, 1976, Archer Agric. Substation

Herbicides[1/]	Rate lb/A[2/]	Percent control[3/] Downy brome	Tansy mustard	Russian thistle	Observations
cyanazine 4WDS + paraquat + X-77	1.6 + 0.25	82	93	100	wild salsify-nightshade
cyanazine 4WDS + paraquat + X-77	2.4 + 0.25	96	97	100	and w. buckwheat
cyanazine + atrazine(PreMix)	2 (form)	63	72	100	not controlled
cyanazine + atrazine(PreMix)	3 (form)	93	98	100	wild salsify in plots
cyanazine + atrazine + X-77(PreMix)	2 (form)	98	100	100	some volunteer wheat
cyanazine + atrazine + X-77(PreMix)	3 (form)	93	96	100	
cyanazine + atrazine + diesel(PreMix)	2 (form)	77	95	97	
cyanazine + atrazine + diesel(PreMix)	3 (form)	81	70	92	wild salsify in plots
cyanazine + atrazine + paraquat(PreMix)	2 (form)	93	97	100	wild salsify in plots
cyanazine + atrazine + paraquat + X-77 (PreMix)	3 (form)	99	97	100	wild salsify in plots
cyanazine + atrazine(TankMix)	2 + 1(form)	83	85	100	
cyanazine + atrazine(TankMix)	1.33 + 0.67(form)	90	95	100	
cyanazine + atrazine + X-77(TankMix)	2 + 1(form)	97	92	99	
cyanazine + atrazine + X-77(TankMix)	1.33 + 0.67(form)	80	78	100	salsify and w. buckwheat
cyanazine + atrazine + diesel(TankMix)	2 + 1(form)	90	80	100	
cyanazine + atrazine + diesel(TankMix)	1.33 + 0.67(form)	68	70	83	
cyanazine + atrazine + paraquat + X-77 (TankMix)	2 + 1 + 0.25(form)	97	99	100	
cyanazine + atrazine + paraquat + X-77 (TankMix)	1.33 + 0.67 +0.25 (form)	82	60	95	wild salsify and buck-wheat
propham + atrazine	3 + 0.4				

[1/] Herbicides applied 4/13/76
X-77 added at rate of 1 qt/100 gal mix
Diesel oil added at rate of 3 gpa
[2/] Form = lb/A respective formulations. TankMix 80% WP
[3/] Visual evaluation - 6/28/76

Downy brome control in established winter wheat. Alley, H.P., A.F. Gale and N.E. Humburg. A postemergence series of individual and combination herbicide treatments were applied to a winter wheat production field with a moderate-to-heavy infestation of downy brome on 4/5/76. Herbicides included in the evaluation series were those indicating promise from previous tests and new candidate compounds. At time of treatment, the winter wheat (variety Cheyenne) was in the two to three tiller stage of growth with four to five inch leaf height and the downy brome was 1/2 to 2 inches high and appeared quite inactive with a reddish cast to the plant. The soil was classified as a sandy loam - 70% sand, 18% silt, 12% clay with 1.1% organic matter and 7.4 pH.

All treatments were applied with a three-nozzle knapsack spray unit in a total volume of 40 gpa water. Plots were one sq rd in size with a randomized complete block experimental design with three replications.

Non-weeded and hand-weeded plots were included to ascertain the competitiveness of downy brome and phytotoxicity of the respective herbicides toward production of winter wheat. All plots, except where a large percentage of winter wheat was killed, were harvested and yield determinations made.

Twenty-one of the thirty-four treatments gave 85% or greater downy brome control; however, eleven of the twenty-one treatments resulted in severe to complete elimination of the winter wheat.

Winter wheat yields, from thirteen of the treatments which gave 85% or better control of downy brome, were equal to or greater than the unweeded check. None of the treated plot yields were greater than the yield from the hand-weeded plots.

These downy brome control evaluations and winter wheat yield determinations indicate that terbutyn, procyazine, metribuzin, propham, LS-69-1299, cyanazine, HOE-23408, VEL-5026 and various combinations of the above herbicides merit further evaluation as potential candidates for downy brome control in established winter wheat. (Wyoming Agric. Exp. Sta., Laramie, SR-762).

Downy brome control and winter wheat stand reduction, growth reduction and yield

Herbicide 1/	Rate lb/A	Downy brome 2/	Winter wheat 3/			Observations
		% control	% stand reduction	% growth reduction	Yield lbs/A	
FMC-25213	1	50	10	50	24.3	downy brome severely stunted
FMC-25213	2	70	40	40	12.3	downy brome severely stunted
FMC-25213	3	90	40	75	5.0	
napronamide	1	0	0	0	20.3	very poor control
napronamide	2	25	0	0	21.0	
terbutryn	1	0	0	0	22.7	
terbutryn + metribuzin	1 + 0.25	98	40	0	24.0	
terbutryn + metribuzin	1 + 0.375	100	90	0	--	
procyazine	2	95	20	10	25.0	looks promising
procyazine + metribuzin	1 + 0.25	100	60	10	24.0	
procyazine + metribuzin	1.5 + 0.25	100	60	5	13.3	
metribuzin	0.125	65	10	0	26.3	
metribuzin	0.25	98	30	0	21.3	
metribuzin	0.375	100	90	0	--	
metribuzin	0.5	100	90	0	--	
metribuzin	0.75	100	99	--	--	bare ground
metribuzin	1.5	100	100	--	--	bare ground
propham	0.5	85	10	10	20.3	
propham	1	85	10	40	18.3	downy brome severely stunted
porpham	2	85	10	60	27.0	
LS-69-1299	2	98	10	30	24.3	wheat chlorotic
LS-69-1299	4	100	80	20	23.0	
cyanazine	1.2	80	5	10	25.0	looks promising
cyanazine + carbetamide	1.6 + 2	98	60	65	--	
cyanazine + metribuzin	1 + 0.25	100	60	5	28.0	
lenacil + WK	0.25	100	60	10	--	
HOE-23408	2	0	0	0	21.0	looks like untreated
HOE-23408	4	0	0	0	25.3	looks like untreated
HOE-23408 + metribuzin	2 + 0.25	99	40	0	25.7	
VEL-5026	0.125	30	10	20	23.0	
VEL-5026	0.25	95	20	10	24.0	
SD-39109	0.5	0	0	0	23.3	
SD-39109	1	0	0	0	24.7	
SD-39109	2	0	0	0	25.7	
Check					16.7	
Handweeded Check					29.7	

1/ Treated 4/5/76
2/ Visual observations
3/ Harvested 7/15/76

Postemergence wild oat control in winter wheat. Brewster, B.D. and A.P. Appleby. Two new herbicides, difenzoquat and HOE 23408, show promise for allowing greater flexibility in postemergence control of wild oats. Difenzoquat has produced erratic wild oat control in western Oregon winter wheat in some instances. The objectives of this research were to (a) determine whether the addition of barban or metribuzin to difenzoquat would improve wild oat control under western Oregon conditions and (b) compare these treatments with HOE 23408 and barban.

The treatments were applied to 8 by 25 ft plots with a bicycle-wheel plot sprayer. Early postemergence treatments were made when the wild oats had one to three leaves and the late postemergence treatments were made when the wild oats had one to three tillers. All treatments were replicated five times at each location. Visual evaluations of wild oat control were made prior to harvest. Wheat yields were determined by harvesting individual plots with a small-plot combine.

The results of this research are summarized in the table below. Although the highest average yield at both locations was obtained from plots treated with difenzoquat + barban at 0.75 + 0.25 lb/A, all treatments significantly increased wheat yields over the untreated check. Several difenzoquat combinations and the HOE 23408 treatments were very effective in reducing wild oat seed production. The use of these treatments should reduce wild oat populations in the subsequent crop year. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

Postemergence wild oat control
in western Oregon winter wheat

Treatment	Rate lb/A	Wheat yield - bu/A		Avg % wild oat control
Early postemergence				
		Location 1	Location 2	
barban	0.38	68.0 b-d	108.1 ab	53
barban	0.5	73.6 a-d	113.2 ab	44
difenzoquat	1.0	74.5 a-d	109.8 ab	67
HOE 23408	1.0	86.0 a	113.8 ab	87
Early postemergence + late postemergence				
barban	0.31 +			
	0.31	85.3 a	108.1 ab	76
Late postemergence				
barban	0.38	64.1 cd	105.1 b	69
barban	0.5	59.0 d	104.1 b	71
difenzoquat	1.0	79.9 a-c	107.8 ab	75
difenzoquat +	0.75 +			
barban	0.25	90.5 a	115.7 a	92
difenzoquat +	0.75 +			
barban	0.33	86.7 a	111.6 ab	92
difenzoquat +	0.75			
metribuzin	0.75	65.2 cd	109.9 ab	56
difenzoquat +	0.75 +			
metribuzin	0.38	81.7 ab	112.4 ab	86
difenzoquat +	0.63 +			
metribuzin	0.38	83.9 ab	110.3 ab	84
HOE-23408	1.0	80.8 a-c	112.2 ab	99
Check	0	42.8 e	70.7 c	0
		C.V. = 15.6%	C.V. = 6.3%	

Numbers in the same column followed by the same letter or group of letters are not different at the 5% probability level according to Duncan's Multiple Range Test

The effect of simulated rainfall and time of day on wild oat control with difenzoquat and HOE 23408. Brewster, B.D. and A.P. Appleby. The abundant rainfall during the winter and early spring months in western Oregon can greatly influence herbicide performance. In western Oregon, HOE 23408 has been very effective on wild oats during the winter while wild oat control in the spring has been erratic. On the other hand, difenzoquat has been more effective in the spring than in the winter. There has also been some question whether these materials were more effective when applied at one time of day over another.

To study the effect of rainfall and time of day on herbicide performance, a monoculture of wild oats was established at Corvallis, Oregon in the spring of 1976. Irrigated and non-irrigated trials were conducted at two growth stages, the first when the wild oats had three leaves and the second when the wild oats had three to four tillers. Each trial had five replicates with 10 by 20 ft plots. At both growth stages the herbicides were applied 24, 12, 8, 6, 3, 1, and 0 hrs before 1/2 inch of water by sprinkler irrigation was applied to both the irrigated and the non-irrigated trials to reduce effects of soil moisture stress.

Two weeks after treatment, a 3 by 18 ft area in each plot was harvested with a self-propelled forage harvester. Statistical analyses were made on the irrigated and non-irrigated trials separately to determine effectiveness relative to the untreated checks. Then the irrigation times treatment interaction from the combined analysis of the irrigated and non-irrigated trials was examined to determine the effect of simulated rainfall on the various treatments.

Rainfall improved HOE 23408 efficacy on the younger oats when 0.5 lb/A was applied 3 to 12 hrs before rain. On the tillered wild oats, rainfall occurring between 0 and 12 hrs after treatment tended to reduce HOE 23408 efficacy. The younger oats were probably more affected by HOE 23408 in the soil than were the older oats.

Difenzoquat was much more sensitive to rainfall than was HOE 23408. Rain occurring up to 24 hrs after treatment caused a significant reduction in efficacy.

No clear effect from application time during the day was found with either herbicide. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

The effect of simulated rainfall and time of day on the activity of difenzoquat and HOE 23408

Treatment	Hr applied before rain	Rate	Fresh weights as a percent of the untreated check[1/] Wild oats - 3 lf Rain	No rain	Rate	Wild oats, 3-4 tiller Rain	No rain
HOE 23408	24	0.5	34.0 g-o	45.3 m-s	0.75	54.5 h-s	68.2 t-w
HOE 23408	12	0.5	12.0 a-h	27.6 c-n	0.75	67.6 r-w	57.1 j-t
HOE 23408	8	0.5	7.5 a-f	41.5 k-r	0.75	64.0 q-w	56.4 i-t
HOE 23408	6	0.5	18.0 a-k	30.3 e-n	0.75	58.2 k-u	46.2 f-o
HOE 23408	3	0.5	18.6 a-l	42.8 m-r	0.75	70.4 t-w	52.9 g-r
HOE 23408	1	0.5	38.9 d-n	29.7 j-q	0.75	74.8 v-y	46.9 f-o
HOE 23408	0	0.5	34.3 h-p	37.7 i-q	0.75	68.6 t-w	49.6 g-q
HOE 23408	24	1.0	3.0 ab	10.3 a-h	1.0	49.5 g-l	48.0 f-p
HOE 23408	12	1.0	7.4 a-e	13.0 a-h	1.0	60.2 n-v	42.3 d-j
HOE 23408	8	1.0	0 a	2.5 ab	1.0	63.9 q-w	45.1 f-m
HOE 23408	6	1.0	1.3 a	6.5 a-e	1.0	62.6 p-w	45.2 f-m
HOE 23408	3	1.0	0.4 a	1.4 a	1.0	58.9 l-u	38.8 b-g
HOE 23408	1	1.0	4.9 a-c	5.1 a-c	1.0	59.6 m-u	44.0 e-l
HOE 23408	0	1.0	0.1 a	1.9 a	1.0	58.6 k-u	43.7 e-k
HOE 23408 + WA[2]	24	0.5	4.9 a-c	21.9 a-m	0.75	55.1 h-s	48.5 f-p
HOE 23408 + WA	12	0.5	14.4 a-i	10.8 a-h	0.75	57.3 k-u	49.1 f-q
HOE 23408 + WA	8	0.5	3.3 a-c	4.8 a-c	0.75	56.6 i-t	46.5 g-q
HOE 23408 + WA	6	0.5	7.6 a-f	14.0 a-i	0.75	55.7 h-t	43.9 e-k
HOE 23408 + WA	3	0.5	3.5 a-c	3.1 ab	0.75	56.1 i-t	50.4 g-q
HOE 23408 + WA	1	0.5	5.8 a-d	4.0 a-c	0.75	70.5 t-w	41.8 c-i
HOE 23408 + WA	0	0.5	9.8 a-g	3.1 ab	0.75	66.7 r-w	41.8 c-i
difenzoquat	24	0.5	49.2 n-t	70.0 t-v	0.75	48.8 f=p	28.8 a-d
difenzoquat	12	0.5	76.2 uv	48.6 n-t	0.75	70.6 t-w	40.9 b-h
difenzoquat	8	0.5	62.7 r-u	56.4 p-u	0.75	75.5 w-y	34.3 a-f
difenzoquat	6	0.5	75.3 uv	73.9 uv	0.75	68.6 s-w	38.4 b-g
difenzoquat	3	0.5	70.3 t-v	59.1 q-u	0.75	87.8 y-z'	48.3 f-p
difenzoquat	1	0.5	101.4 wx	61.1 q-u	0.75	89.2 zz'	38.4 b-g
difenzoquat	0	0.5	114.5 x	69.7 t-v	0.75	101.8 z'	44.2 e-l
difenzoquat	24	0.75	45.4 m-s	24.2 a-m	1.0	45.6 f-n	23.4 a
difenzoquat	12	0.75	41.9 l-r	15.8 a-j	1.0	51.0 g-q	29.9 a-e
difenzoquat	8	0.75	48.4 n-t	15.3 a-j	1.0	70.5 t-w	27.6 a-c
difenzoquat	6	0.75	55.8 o-u	13.8 a-i	1.0	60.9 o-w	27.4 ab
difenzoquat	3	0.75	67.6 s-v	6.9 a-e	1.0	72.1 u-x	28.6 a-d
difenzoquat	1	0.75	68.4 s-v	26.4 b-n	1.0	85.3 x-z	23.4 a
difenzoquat	0	0.75	89.5 vw	31.7 g-n	1.0	92.0 zz'	34.5 a-f

1/ Treatment means within the same growth stage and followed by the same letter or group of letters are not significantly different at the 5% level of probability according to Duncan's Multiple Range Test

2/ Wex added at a rate of 1/2% v/v

Italian ryegrass and wild oat control in winter wheat. Brewster, B.D. and A.P. Appleby. Wild oats and Italian ryegrass can be very competitive in fall-sown wheat in western Oregon. In the fall of 1975, field trials were established at three locations to compare commercially available herbicides with HOE 23408, alone and in combination with residual broadleaf herbicides, for grass control in wheat.

Post-plant incorporated treatments were applied in October or November and were incorporated with a tractor-drawn harrow before wheat emergence. Early postemergence applications were made from November through January when the wheat had two to three leaves. Late postemergence applications were made when the wheat had begun to tiller. Each location had five replications with 10 by 25 ft plots.

Visual evaluations were made during the growing season. Wheat grain yields were determined by harvesting the individual plots with a small-plot combine in August. Overall yield results and weed control ratings are given in the table.

Excellent yield increases over the untreated check were obtained from all applications of HOE 23408 and the triallate combinations. The postemergence HOE 23408 treatments produced superior wild oat control because the soil persistence of this material was sufficient to kill many late-germinating oats.

The excellent control of ryegrass and wild oats with HOE 23408 and the wide range of effective application timings make this compound superior to other grass herbicides in western Oregon wheat. (Agronomic Crop Science Department, Oregon State University, Corvallis, OR 97331).

Winter wheat grain yields from three locations treated for Italian ryegrass and wild oat control, western Oregon, 1975-76

Treatment	Rate lb/A	Wheat grain yields (bu/A) Locations 1	2	3	Avg	% Average weed control Ryegrass	Wild oats
Post-plant incorporated							
triallate	1.25	87.5	81.4	27.5	65.5	36	37
Post-plant incorporated + early post							
triallate + diuron	1.25 + 1.6	128.0	89.0	35.9	84.3	91	54
Post-plant incorporated + late post							
triallate + barban	1.25 + 0.38	130.9	92.5	45.9	89.8	90	68
Post-plant incorporated + early post + late post							
triallate + diuron + barban	1.25 + 1.6 + 0.38	128.3	87.8	44.7	86.9	93	72
Preemergence							
nitrofen	3.0	65.2	79.3	23.6	56.0	31	18
HOE 23408	1.0	126.8	79.5	44.0	83.4	98	61
Early postemergence							
diuron	1.6	68.5	83.5	15.7	55.9	36	3
barban	0.38	106.8	92.0	18.2	72.3	54	63
HOE 23408	0.75	134.4	100.7	34.9	90.0	99	90
HOE 23408	1.0	131.3	92.8	47.2	90.4	99	91
HOE 23408 + diuron	0.75 + 1.2	127.5	93.9	46.4	89.3	99	85
HOE 23408 + diuron	1.0 + 1.2	127.8	95.2	40.3	87.8	99	84
metribuzin	0.50	120.1	86.3	40.0	82.1	90	63
HOE 23408 + metribuzin	0.75 + 0.38	131.1	94.1	39.7	88.3	99	81
HOE 23408 + metribuzin	1.0 + 0.38	126.1	99.8	50.9	92.3	99	86
Late postemergence							
barban	0.38	107.6	79.5	20.6	69.2	64	49
metribuzin	0.50	77.7	97.3	42.5	72.5	73	50
HOE 23408 + metribuzin	0.75 + 0.38	128.4	82.7	41.0	84.0	99	88
HOE 23408	0.75	133.9	85.1	44.6	87.9	99	96
Check	0	41.3	53.1	6.4	33.6	0	0
$L.S.D._{.05}$		9.9	13.0	13.2			

Canarygrass control in wheat. Cudney, D.W. and J.E. Hill. Canarygrass is an important weed problem in several California counties. It is the most severe grass weed species found in wheat in the desert regions of the Imperial and Palo Verde Valleys. A trial was established on the University of California Imperial Valley Field Station near El Centro, Imperial County, California, to evaluate several herbicides for controlling canarygrass in wheat.

The plot area was broadcast-seeded to canarygrass and lightly disked prior to drilling 80 lb seed per acre of Cajeme 71 wheat. Preemergence surface (PES) applications of HOE 23408 (1.5 lbs/A) and nitrofen (3 lbs/A) were made after planting on December 10, 1975. The first of seven irrigations was made on December 11, 1975. The soil was on Imperial clay with less than 0.5% organic matter. Postemergence applications (table) were made on January 16, 1976, when the canarygrass plants were in the one to three leaf stage. All applications were made with a constant pressure CO_2 sprayer at 35 psi and 30 gpa. One treatment was hand weeded at the time of the postemergent applications and again four weeks later.

Three herbicides, nitrofen, HOE 23408, and metribuzin gave good control of canarygrass. HOE 23408 applied preemergence to the soil surface provided better control than a similar application postemergence. Postemergence applications of bifenox and difenzoquat did not control canarygrass. The population of canarygrass in the plot area was two plants per square foot of area. Nitrofen was the only herbicide treatment to increase yield significantly above the untreated check at the low canarygrass populations in this trial. However, a trend toward higher yields as weed control increased was apparent. Bushel weight was also unaffected by a weed control treatment. The selective control of canarygrass in wheat, however, was encouraging. (University of California, Cooperative Extension, Imperial County and Davis, CA 95616).

Canarygrass control in wheat

Treatment	Rate lb/A	Canarygrass[1,2] control	Yield[1,3] lb/A	Bushel wt[1,3]
Preemergence				
HOE 23408	1.5	9.8	8990 ab	63.3 a
nitrofen	3.0	8.0	9050 a	63.8 a
Postemergence				
HOE 23408	1.5	7.5	8650 a-c	63.3 a
metribuzin	0.25	9.0	8880 a-c	63.0 a
bufenox	2.0	0	8930 a-c	63.5 a
difenzoquat	1.0	0	8140 c	63.3 a
hand-weeded	-	3.5	8820 a-c	63.8 a
Untreated	-	0	8170 bc	63.8 a

1/ Average of four replications
2/ 0 = no control, 10 = complete control
3/ Means followed by the same letter are not significantly different at the 5% level

Combinations of tillage and glyphosate to control quackgrass in wheat and barley. Evans, J.O. For the past four years glyphosate has proven to be a valuable component of a quackgrass control program prior to planting small grains, corn or alfalfa. Tests have shown that quackgrass grows vigorously in the early spring in Utah and reaches a height of eight to ten inches during the first two weeks of growth from rhizomes. Quackgrass growth begins in March in most of Utah and allows ample time to conduct preplant control procedures with tillage and short residual herbicides and still have time to realize excellent crop yields.

In 1975 and 1976, we demonstrated the success of a preplant program for wheat and barley in five locations in Utah. Trials were conducted in Heber, Coalville, Hyrum, North Logan and Smithfield, and the results are summarized below.

Heber. On May 12, 1975, five acres of quackgrass were treated with 3 lb/A glyphosate when the quackgrass was eight inches tall. Seven days after spraying the field was plowed and prepared for barley. The crop was planted on the ninth day after treatment. Ninety-two percent quackgrass control was recorded in the treated area compared with no control adjacent to the experimental area. The yield of irrigated barley was 86 bu/A where the herbicide was used. This compared to no yield in the same area the previous year because of a severe quackgrass infestation.

Coalville. Three acres of wheat land were treated with 3 lb/A glyphosate in 20 gpa water. No other herbicides or additives were used since quackgrass was the predominant weed. Six days after spraying the land was worked for planting. Fremont wheat was planted, irrigated and produced 79 bu/A of clean grain. Previous yields from this field have ranged from 10 to 20 bu/A under similar agronomic manipulation except spraying. Quackgrass infestation has been heavy and accounted for the yield loss.

North Logan. A three acre field heavily infested with the weed was treated on March 31, 1975, when the grass was twelve inches tall. A dosage of 3 lb/A glyphosate was applied in 20 gpa water. Twelve days after treating the area was plowed and disked. Circumstances prevented planting a spring wheat crop as planned but the land was worked at three week intervals during the summer and planted to fall wheat in August 1975. The resulting crop was the first produced on this land in three years. Two previous crops were plowed under due to quackgrass competition. The yield was 92 bu/A of excellent quality wheat. Combining glyphosate with tillage was far better than tillage alone to control quackgrass in this field.

Hyrum. A mixed weed population dominated by quackgrass prevented satisfactory production from a two acre plot in spite of rigorous attempts to mechanically control the weed. The problem had actually increased rapidly in recent years. The two sides of the field were treated with 3 lb/A glyphosate and a 30 ft check strip was left in the middle. The field was prepared for planting and seeded to barley ten days after treating. A visable difference existed between the treated and untreated areas, no quackgrass appeared in the treated portion and the grain was noticeably taller. The herbicide plus tillage treatment controlled quackgrass 95 percent or better. The field had 30 bu/A in 1975 but produced 106 bu/A barley in the treated portion in 1976. The untreated section was not harvested due to intense quackgrass growth and absence of barley.

Smithfield. A three-acre quackgrass infested parcel in the center of a large field was treated with 3 lb/A glyphosate on May 3, 1976 after the land had previously been disked and the quadkgrass allowed to grow to a height of eight inches. Seven days after spraying the quackgrass was necrotic and extremely wilted. The entire field was worked and planted to wheat ten days after spraying. Very limited quackgrass regrowth was observed in the treated area, whereas it grew vigorously in the wheat outside the treated area. Over 80 bu/A was recorded in the treated area where no crop had been harvested the two previous years. (Utah Agricultural Experiment Station, Logan, UT 84321).

Influence of glyphosate in combination with tillage to control quackgrass and improve small grain yields

Location	Year treated	Crop	Yield (bu/A)	Quackgrass control (%)	Increases in yield over previous year (bu/A)
Heber	1975	barley	86	92	86
Coalville	1975	wheat	79	95	65
North Logan	1975	wheat	99	92	99
Hyrum	1976	barley	106	95	76
Smithfield	1976	wheat	80	90	80

<u>Combinations as tank mixes and split applications for wild oat and broadleaf herbicides in wheat.</u> Hill, J.E., S.W. Kite and N.L. Smith. Wild oats and broadleaved weeds occur together in wheat and barley. Combinations of herbicides for the control of these weeds were studied in a trial in Kings County near Corcoran, California. The test site of Anza wheat was heavily infested with wild oats (100 to 150 wild oats per sq ft), fiddleneck, chickweed, and mustard. The wild oat herbicides, dichlofop-methyl, barban, and difenzoquat were applied on February 26, (1) alone, (2), as tank mixes with each of three broadleaf herbicides and (3) as the first of a split application followed with broadleaf herbicides in 19 days. The broadleaf herbicides, 2,4-D LV ester, bromoxynil and bifenox were applied on February 26 and at the time of the second application on March 17 alone and in the tank or split application described above.

At the time of the first application wild oats were in the two to seven leaf stage, mustard was 1 to 2 inches tall and fiddleneck was one to two leaf. The crop was tillered and 6 inches tall. Evaluations of the plots treated on February 26 were made on March 17 for fiddleneck, chickweed, and mustard control and crop phytotoxicity. Over-all broadleaf weed and wild oat control were evaluated on April 10 at heading. At this time wild oats and wheat were lodged in the plots not treated for wild oats. Broadleaf species were not evaluated separately at the later evaluation date.

Fiddleneck was controlled at the early spray date with bromoxynil and bifenox. All tank mix combinations of wild oat herbicides with bromoxynil provided adequate fiddleneck control. Tank mixes of bifenox with difenzoquat and dichlofop-methyl gave good fiddleneck control whereas tank mixes of bifenox with barban gave less control than with bifenox alone. When 2,4-D was applied alone and in tank mixes with the three wild oat herbicides fiddleneck was not controlled. All three broadleaf herbicides provided good mustard control alone and in tank mix combination with the wild oat herbicides. Chickweed was not adequately controlled with any of the three broadleaf herbicides alone or in combination (data not shown). General broadleaf control ratings (over-all column - see table) by April 10 were acceptable whether 2,4-D or bromoxynil were applied as a tank mix or separately at the later date. Broadleaf control with bifenox, however, was reduced when sprayed alone or in combination at the later date. Broadleaf weeds, especially fiddleneck, were controlled in part by the vigorous growth of wild oats, thus accounting for the over-all good broadleaf control at the later evaluation. Yield was not significantly increased over the untreated plot with any broadleaf herbicide excepting in combination with a wild oat herbicide indicating that wild oats were a much greater weed problem in this trial.

Wild oats were at least partially controlled by all three of the wild oat herbicides. Increases in yield over the check were significant at the one percent level with every wild oat herbicide treatment excepting dichlofop-methyl and barban tank mixes with 2,4-D and the barban-bromoxynil tank mix. Yield from the latter combination was, however significant at the five percent level. The best wild oat control was obtained with difenzoquat either alone or in combination with the broadleaf herbicides. Good wild oat control was obtained with dichlofop-methyl although the application at the two to seven leaf stage of wild oats was late for this herbicide. Wild oat control was completely lost when dichlofop-methyl was tank mixed with 2,4-D at the later date as a split application as seen by comparing wild oat control ratings or yields for these treatments (table). Wild oat control by barban resulted in yields significantly greater than the check. Barban, however, gave less control than the other wild oat herbicides, in part because of the lateness of the application with respect to wild oat growth. The wild range of wild oat growth stages at the time of the first application (two to seven leaf) illustrates the variability of wild oat growth and the difficulty of timing foliar wild oat herbicides to a narrow range of growth stages.

Combinations of broadleaf and wild oat herbicides offer many advantages and more work is needed to determine the weed control and compatibility of these mixtures. (University of California, Cooperative Extension, Davis, Kings Co., Davis, CA).

Wild oat and broadleaf weed control in wheat

Treatment 1/	Rate lb/A	Fiddleneck 2/ control	Mustard 2/ control	Wheat 2/ phyto	General 2/ broadleaf control	Wild oat control	Yield 3/ (lb/A)	
2,4-D LV ester (Feb 26)	0.5	6.0	9.8	0	9.0	0.5	410	i
bromoxynil (Feb 26)	0.5	10.0	10.0	0	8.8	1.3	1460	e-h
bifenox (Feb 26)	1.0	10.0	9.5	0	9.0	0.5	350	i
dichlofop-methyl	1.0	2.5	2.5	0.5	3.8	6.8	3180	bc
dichlofop-methyl + 2,4-D	1.0 + 0.5	3.0	9.8	0.3	8.8	0.8	630	g-i
dichlofop-methyl/2,4-D	1.0/0.5	-	-	-	8.8	6.8	3270	bc
dichlofop-methyl + bromoxynil	1.0 + 0.5	10.0	10.0	1.3	8.5	7.0	3320	bc
dichlofop-methyl/bromoxynil	1.0/0.5	-	-	-	9.0	6.8	2630	cd
dichlofop-methyl + bifenox	1.0 + 1.0	7.5	7.0	1.0	9.0	5.1	1950	d-f
dichlofop-methyl/bifenox	1.0/1.0	-	-	-	6.0	6.6	2680	cd
difenzoquat	1.0	0	0	0.8	5.5	8.9	3890	ab
difenzoquat + 2,4-D	1.0 + 0.5	1.5	10.0	1.3	9.0	9.5	4790	a
difenzoquat/2,4-D	1.0/0.5	-	-	-	8.5	9.0	3800	ab
difenzoquat + bromoxynil	1.0 + 0.5	7.5	10.0	1.0	9.0	9.5	4170	ab
difenzoquat/bromoxynil	1.0/0.5	-	-	-	9.0	9.0	3560	bc
difenzoquat + bifenox	1.0 + 1.0	9.8	9.8	1.3	8.8	8.3	3760	a-c
difenzoquat/bifenox	1.0/1.0	-	-	-	6.5	9.3	3310	bc
barban	0.38	0	2.5	1.5	4.7	3.4	1550	e-h
barban + 2,4-D	0.38 + 0.5	2.8	7.3	1.0	9.0	0.8	910	f-i
barban/2,4-D	0.38/0.5	-	-	-	6.8	4.8	1550	e-h
barban + bromoxynil	0.38 + 0.5	10.0	10.0	1.8	9.0	2.9	1300	e-i
barban/bromoxynil	0.38/0.5	-	-	-	8.5	5.4	1710	d-g
barban + bifenox	0.38 + 1.0	5.3	9.8	1.5	7.0	3.8	1800	d-g
barban/bifenox	0.38/1.0	-	-	-	6.0	4.8	2080	de
2,4-D (Mar. 17)	0.5	-	-	-	8.8	1.0	590	hi
bromoxynil (Mar 17)	0.5	-	-	-	9.0	1.3	900	f-i
bifenox (Mar 17)	1.0	-	-	-	6.5	0	360	i
untreated	-	0	2.0	0	4.0	0	390	i

1/ + indicates tank mix; / indicates split application
2/ 0 = no control or no effect, 10 = all weeds killed, or complete wheat kill
3/ Numbers followed by the same letter do not differ significantly at the 1% level

Wild oat control in spring wheat. Hill, J.E., K.G. Baghott and N.L. Smith. Wild oats are a serious weed problem in spring and winter wheat culture in California. A trial was established on the University of California Tulelake Field Station to evaluate the effect of timing of postemergence herbicide applications to wild oat control and wheat yield in spring planted Anza wheat. Three rates of difenzoquat and dichlofop-methyl were applied to wild oats in the two, four and well tillered stages of development based on the growth stage of the majority of wild oats in the treated area. Barban was applied to two and four leaf wild oats on a single treatment and as a split application. The second treatment of the split application was made when most of the wild oats in the untreated plot were in the four leaf stage. All herbicides were applied with a CO_2 backpack sprayer. Difenzoquat and dichlofop-methyl were applied in 20 gpa at 30 psi and barban was applied in 10 gpa at 45 psi.

Wild oats were effectively controlled by difenzoquat applied at the four-leaf and tillering stages of development. Difenzoquat at the two-leaf stage was less effective than the later applications because wild oat control at the two and four-leaf stages of wild oat development. When dichlofop-methyl was applied at tillering less wild oat control was obtained. Wild oats were partially controlled by barban as determined by visual weed control ratings. (University of California, Cooperative Extension, Davis, Tulelake and Davis, CA).

Wild oat control in spring wheat

Herbicide	Rate lb/A	Wild oat growth stage	Phytotoxicity[1/] 6/11/76	Wild oat[1/] control 8/24/76	Yield[2/] (lb/A)	
difenzoquat	0.63	2 leaf	0.3	3.5	4440	ab
difenzoquat	0.75		0.3	5.5	4260	ab
difenzoquat	1.0		0	5.9	4330	ab
dichlofop-methyl	0.75	2 leaf	0	9.5	5400	ab
dichlofop-methyl	1.0		0	9.6	5750	a
dichlofop-methyl	1.5		1.0	9.7	5050	ab
barban	0.313	2 leaf	0.5	6.9	4250	ab
barban	0.313	2 and 4 leaf	0	6.0	5200	ab
barban	0.5	2 leaf	0.3	6.4	4720	ab
difenzoquat	0.63	4 leaf	1.3	5.8	4990	ab
difenzoquat	0.75		1.3	8.5	5640	a
difenzoquat	1.0		1.3	9.7	5260	ab
dichlofop-methyl	0.5	4 leaf	1.0	8.9	5660	a
dichlofop-methyl	1.0		1.0	9.6	5470	ab
dichlofop-methyl	1.5		1.0	9.9	5590	a
barban	0.5	4 leaf	0.5	6.3	5460	ab
difenzoquat	0.63	tillered	0	6.7	5140	ab
difenzoquat	0.75		0.3	9.0	5370	ab
difenzoquat	1.0		0	9.8	4810	ab
dichlofop-methyl	0.75	tillered	0	6.8	4430	ab
dichlofop-methyl	1.0		0	7.9	5330	ab
dichlofop-methyl	1.5		0.3	6.3	4180	ab
barban	0.5	tillered	0.3	4.5	4200	ab
untreated	-	-	0.3	2.3	3370	b

1/ 0 = no plants killed, 10 = plants killed

2/ Numbers followed by the same letter are not significantly different at the 5% level

Downy brome screening trials in winter wheat. Rydrych, D. J. This study was initiated on the Pendleton Station in 1975-76 to determine the effectiveness of three selective herbicides for the control of downy brome in winter wheat. Incorporated treatments were applied on September 18, 1975. Preemergence treatments were applied October 6, 1975, and postemergence treatments were applied December 10, 1975.

The weed spectrum contained heavy stands of downy brome and light stands of false flax, fiddleneck, and Jim Hill mustard. Winter wheat (variety McDermid) was seeded on October 2, 1975. The results are recorded in the table. HOE 23408 was highly effective on downy brome (incorporated) but was weak on broadleaved weeds. HOE 23408 is not as active on downy brome when applied preemergence or postemergence. Trifluralin is effective on downy brome (soil incorporated) and was used as a control treatment in the trial.

The results indicate that HOE 23408 (incorporated) and metribuzin (postemergence) are both very effective on downy brome. Trials will be continued in 1977 to test the effectiveness of HOE 23408 in combination with other herbicides. (Columbia Basin Agricultural Research Center, Pendleton, OR 97801).

Results of downy brome screening trials in winter wheat at Pendleton, Oregon -- 1976

Treatment[1/]	Rate lb/A	Time	Winter wheat yield lb/A	Broadleaved weed control %	Downy brome control %
HOE 23408	.75	Incor	4590	61	91
HOE 23408	1.50	Incor	4240	40	98
trifluralin	.75	Incor	4470	40	87
HOE 23408	.75	Pre	4130	53	68
HOE 23408	1.50	Pre	3990	60	82
HOE 23408	1.50	Post	3380	50	47
metribuzin	.50	Post	4890	100	97
metribuzin	1.00	Post	4090	100	100
metribuzin + terbutryn	.33 + .80	Post	4840	100	99
metribuzin + bromoxynil	.33 + .25	Post	4990	100	95
metribuzin + dicamba	.33 + 2 oz	Post	4400	100	92
weeded control	-	--	4420	100	100
control	-	--	2410	0	0

1/ Treatment pre-plant incorporated on 9/18/75; pre-emergence on 10/6/75; and post-emergence on 12/10/75

Downy brome control in winter wheat using a no-till culture. Rydrych, D.J. This study was initiated at the Pendleton Station to determine the effectiveness of selective herbicides on downy brome and other annual weeds. Treatments were applied in January, 1976, when winter wheat was in the four-leaf stage. All treatments were applied postemergence to downy brome and winter wheat (variety McDermid).

The weed spectrum contained downy brome, fiddleneck, blue mustard, prickly lettuce, and umbellate chickweed. Broadleaved weed control was excellent in all treatments except HOE 23408. Downy brome control was evident in all metribuzin treatments. Cyanazine was also active on downy brome. Linuron, diuron, and 2,4-D, and bromoxynil-MCPA were used as controls for broadleaved weeds and were not expected to control downy brome.

No-till seedbeds are often free of weed growth when winter wheat is planted. However, a good selective weed control program is needed after the crop has emerged. The results of this trial are recorded in the table. Notice that when the control treatments failed to suppress downy brome there was a sharp decrease in wheat yield. (Columbia Basin Agricultural Research Center, Pendleton, OR 97801).

Downy brome control in winter wheat using a no-till culture -- Pendleton Station -- 1976

Treatment[1/]	Rate lb/A	Winter wheat yield (lb/A)	Broadleaved weed control (%)	Downy brome control (%)
metribuzin	.25	2930	100	90
metribuzin	.33	3400	100	96
metribuzin	.50	3140	100	99
metribuzin + dicamba	.33 + 2 oz	3750	99	96
metribuzin + terbutryn	.25 + 1.00	3280	100	99
metribuzin + bromoxynil	.33 + .25	2880	98	95
bromoxynil + MCPA	.38 + .38	1000	99	0
2,4-D (butyl)	1.00	1070	100	0
diuron	1.25	1960	100	0
linuron	.75	2340	96	0
cyanazine	1.50	2710	90	88
HOE 23408	3.00	2270	20	50
control	-	240	0	0

1/ Treatments applied post-emergence on 1/26/76; 2,4-D applied on 4/16/76

AUTHORS

AUTHORS (continued)

AUTHORS (continued)

CROPS

CROPS (continued)

HERBACEOUS WEEDS

(arranged alphabetically by scientific name)

HERBACEOUS WEEDS (continued)

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HERBACEOUS WEEDS (continued)

(arranged alphabetically by common name)

WOODY PLANTS

INSECTS

HERBICIDE COMMON NAME OR DESIGNATION

This table was compiled from approved nomenclature adopted by the Weed Science Society of America (Weed Science 23(6), 1975 and WSSA Herbicide Handbook 3rd ed.). Page refers to the page where a report about the herbicide begins, actual mention may be on a following page. A herbicide name occupying two or more lines and separated by an equal (=) sign is written as one work if written on one line.

Common Name or Designation	Chemical Name	Page
alachlor	2-chloro-2', 6'diethyl-N-(methoxy= methyl)acetanilide	63, 82, 116, 118, 120, 122, 124, 130, 132, 133, 135, 136, 137, 140
asulam	methyl sulfanilylcarbamate	106
atrazine	2-chloro-4-(ethylamino)-6-(iso= propylamino)-s-triazine	13, 109, 122, 124, 128, 133, 165
barban	4-chloro-2-butynyl m-chloro= carbanilate	115, 169, 173, 178 181
BASF 9021	Unavailable	156
BAY-NTN-6867	O-methyl-O-(4-methyl-2-nitrophenyl)-l-methylethyl phosphoramidothioate	102
benefin	N-butyl-N-ethyl-α,α,α-trifluoro-2,6-dinitro-p-toluidine	103
bensulide	O-O-diisopropyl phosphorodithioate S-ester with N-(2-mercaptoethyl) benzenesulfonamide	72
bentazon	3-isopropyl-lH-2,1,3-benzothia= diazin-(4)3H-one 2,2-dioxide	5, 63, 73, 120, 130, 140
bifenox	methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate	63, 100, 122, 143, 144, 175, 178
bromoxynil	3,5-dibromo-4-hydroxybenzonitrile	178, 183, 184
butralin	4-(1,1-dimethylethyl)-N-(1-me= thylpropyl)-2,6-dinitro= benzenamine	102, 103, 116, 120, 143
butylate	S-ethyl diisobutylthio= carbamate	124, 126, 128, 130, 135, 136, 137

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
cacodylic acid	hydroxydimethylarsine oxide	3, 59
carbetamide	D-N-ethyllactamide carbanilate (ester)	109, 167
CDED	2-chloroallyl diethyl= dithiocarbamate	45, 74
CGA-2758	Unavailable	133
chloramben	3-amino-2,5-dichloroben= zoic acid	45, 69, 71, 74, 76, 77, 82, 87, 104, 116
chloroflurenol	methyl-2-chloro-9-hydroxy= fluorene-9-carboxylate	5, 6
chloroxuron	3-[p-(p-chlorophenoxy) phenyl]-1,1-dimethylurea	13, 52, 60
chlorpropham	isopropyl m-chlorocarbanilate	102
cyanazine	2-[[4-chloro-6-(ethylamino)-s-triazin-2-yl]amino]-2-methyl= propionitrile	13, 108, 109, 122, 124, 128, 165, 167, 184
cycloate	S-ethyl N-ethylthiocyclo= hexanecarbamate	78, 146, 152, 154, 160, 162
cyperquat	1-methyl-4-phenylpyridinium	59
dalapon	2,2-dichloropropionic acid	3, 13, 34, 156
DCPA	dimethyl tetrachlorotereph= thalate	56, 102
desmedipham	ethyl m-hydroxycarbanilate carbanilate (ester)	148, 150, 152, 156, 158
dicamba	3,6-dichloro-O-anisic acid	4, 5, 6, 11, 12, 59, 122, 183, 184
dichlofop-methyl	Methyl 2-[4-(2,4-dichloro-phenoxy)phenoxy]propanoate	63, 73, 77, 103, 106, 111, 113, 115, 120, 143, 148, 150, 154, 156, 158, 160, 162, 167, 169, 171, 173, 175, 178, 181, 183, 184

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
difenzoquat	1,2-dimethyl-3,5-diphenyl-1H-pryazolium	63, 111, 115, 169, 171, 175, 178, 181
dinitramine	N^4,N^4-diethyl-α,α,α-trifluoro-3,5-dinitrotoluene-2,4-diamine	88, 103, 116, 120, 148, 150, 158
dinoseb	2-sec-butyl-4,6-dinitrophenol	35, 66, 104
diphenamid	N,N-dimethyl-2,2-diphenylace=tamide	74, 140
diuron	3-(3,4-dichlorophenyl)-1,1-dimethylurea	7, 37, 100, 104, 138, 139, 142, 173, 184
Dow 356	Unavailable	120, 143, 144
Dowco 290	3,6-dichloropicolinic acid	4, 5, 6, 11, 12
Dowco 295	Unavailable	140
EL 171	Unavailable	10, 140
endothall	7-oxabicyclo[2.2.1] heptane-2,3-dicarboxylic acid	162
EPTC	S-ethyl dipropylthiocarbamate	45, 55, 72, 78, 100, 103, 118, 120, 124, 126, 130, 132, 133, 135, 136, 137, 146
ethafluralin	N-ethyl-N-(2-methyl-2-propenyl)-2,6-dinitro-4-(trifluoromethyl) benzenamine	116, 118, 120, 133
ethofumesate	2-ethoxy-2,3-dihydro-3,3-dimethyl-5-benzofuranyl methane=sulphonate	55, 56, 146, 148, 150, 152, 154, 156, 158, 160, 162
fluchloralin	N-(2-chloroethyl)-2,6-dinitro-N-propyl-4-(trifluoromethyl) aniline	100, 116
FMC-25213	r-2-ethyl-5-methyl-c-5-(2-methylbenzyloxy)-1,3-dioxane	5, 10, 35, 43, 45, 52, 69, 71, 72, 73, 74, 76, 82, 84, 90, 100, 167

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
fenuron	1,1-dimethyl-3-phenylurea	19
fonofos (insecticide)	0-ethyl-S-phenylethylphosphono-dithiolate	132
GCP 6137	Unavailable	143, 144
GK-40	Unavailable	4, 11
glyphosate	N-(phosphonomethyl)glycine	2, 3, 4, 6, 7, 8, 10, 11, 13, 26, 27, 29, 30, 31, 32, 34, 35, 37, 59, 61, 63, 106, 108, 109, 138, 139, 176
H-22234	N-chloroacetyl-N-(2,6-diethyl=phenyl)glycine ethyl ester	146, 152, 154, 162
H-26905	0-ethyl-0-(3-methyl-6-nitrophenyl)-N-*sec*-butyl-phosphorothioamedate	61, 73, 85
H-26910	N-chloracetyl-N-(2-methyl-6-ethylphenyl)-glycine isopropyl ester	10, 72, 77 140, 144
hexaflurate	potassium hexafluoroarsenate	16
HOE-23408	See dichlofop-methyl	
HOE-29152	Unavailable	140
Krenite	Ammonium ethyl carbamoxylphosphonate	20
lenacil	3-cyclohexyl-6,7-dihydro-1*H*-cyclopentapyrimidine-2,4(3*H*,5*H*)-dione	108, 109, 167
linuron	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea	56, 184
LS-69-1299	Unavailable	167
M-3432	S-benzyl N,N-di-sec-butyl thiocarbamate	143, 144

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
MBR-12325	See mefluidide	
MCPA	[(4-chloro-o-tolyl)oxy] acetic acid	184
mefluidide	N-[2,-4-dimethyl-5-[[(tri= fluoromethyl) sulfonyl]amino] phenyl]acetamide	6, 29, 37
metamitron	4-amino-3-methyl-6-phenyl-1,2,4-thiazin-5(4H)-one	156, 158, 160
metham	sodium methyldithiocarbamate	78, 80
methazole	2-(3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione	13, 38, 52
methyl bromide	bromomethane	9, 81
metolachlor	2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide	63, 116, 120, 122, 124, 126, 128, 133 135, 136, 137
metribuzin	4-amino-6-tert-butyl-3-(methylthio)-as-triazine-5 (4H)one	5, 50, 74, 76, 82, 87, 88, 95, 100, 104, 109, 167, 169, 173, 175, 183, 184
molinate	S-ethyl hexahydro-1H-azepine-1-carbothioate	78
MSMA	monosodium methanearsonate	6, 26, 27, 29, 31, 32, 59
MV-687	Unavailable	72, 74, 76, 84, 88, 133
napropamide	2-(α-naphthoxy)-N,N-diethyl= propionamide	13, 35, 38, 41, 45, 56, 63, 69, 71, 72, 74, 84, 87, 98, 100, 140, 167
nitrofen	2,4-dichlorophenyl-p-nitro= phenyl ether	52, 60, 173, 175
norflurazon	4-chloro-5-(methylamino)-2-(α,α,α-trifluoro-m-tolyl)-3(2H)-pyridazinone	10, 35, 45, 50

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
1,3-D	1,3-dichloropropene	68, 80
oryzalin	3,5-dinitro-$\underline{N}^4$,$\underline{N}^4$-dipropyl=sulfanilamide	35, 38, 43, 45, 50, 63, 67, 106
oxadiazon	2-tert-butyl-4-(2,4-dichloro-5-isopropoxyphenyl)-Δ^2-1,3,4-oxadiazolin-5-one	13, 35, 41, 52, 63
oxyfluorfen	2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-trifluoromethyl benzene	35, 38, 43, 50, 59, 63, 73, 84
paraquat	1,1'-dimethyl-4,4'-bipyridinium ion	10, 37, 104, 109, 165
pebulate	S-propyl butylethyl=thiocarbamate	45, 69, 71, 72, 74, 76, 78, 84, 87, 140, 146
penoxalin	N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine	35, 38, 88, 116, 118, 122, 124
perfluidone	1,1,1-trifluoro-N-[2-methyl-4-(phenylsulfonyl)phenyl]methane=sulfonamide	63, 88, 130, 143
phenmedipham	methyl m-hydroxycarbanilate m-methylcarbanilate	52, 60, 146, 148 150, 152, 156, 158
picloram	4-amino-3,5,6-trichloro=picolinic acid	4, 6, 11, 12, 18, 20
PPG-124	p-chlorophenyl-N-methyl carbamate	104
procyazine	2-[[4-chloro-6-(cyclopropyl=amino)-1,3,5-triazine-2yl] amino]-2-methylpropanenitrile	108, 109, 122, 128, 133, 167
prodiamine	N^3,N^3-di-n-propyl-2,4-dinitro-6-trifluoromethyl-m-phenylenediamine	38, 50, 63, 67, 68, 95
profluralin	N-(cyclopropylmethyl)-α,α,α-trifluoro-2,6-dinitro-N-propyl-p-toluidine	68, 103, 120
pronamide	3,5-dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	95, 98, 100, 102, 104, 106, 146

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
propachlor	2-chloro-N-isopropylacetanilide	143, 144
propham	isopropyl carbanilate	55, 95, 165, 167
pyrazon	5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone	140, 146, 152, 154, 158, 162
R-24191	Unavailable	72
R-25788	N,N-diallyl-2,2-dichloro=acetamide	103, 124, 126, 128, 130, 132, 133, 135, 136, 137
R-29148	2,2,5-trimethyl-N-dichloro=acetyl-oxazolidine	136
R-33222	Unavailable	95, 133, 136
R-33669	Unavailable	72, 77
R-36548	Unavailable	72
R-37878	Unavailable	10, 45, 71, 72, 84, 88, 133, 143, 144, 154, 160
RH-6201	Unavailable	72, 77, 84, 120
RP-20630	Unavailable	41
secbumeton	N-ethyl-6-methoxy-N(1-methylpropyl)-1,3,5-triazine-2,4-diamine	100
SD 39101	Unavailable	167
simazine	2-chloro-4,6-bis(ethylamino)-s-triazine	2, 3, 7, 8, 35, 37, 63, 66, 100
SN 503	phenmedipham + desmedipham	158
TCA	trichloroacetic acid	140
tebuthiuron	N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea	19
terbacil	3-tert-butyl-5-chloro-6-methyluracil	98, 100, 104, 140

HERBICIDE COMMON NAME OR DESIGNATION (continued)

Common Name or Designation	Chemical Name	Page
terbutryn	2-(tert-butylamino)-4-(ethylamino)-6-(methylthio)-s-triazine	167, 183, 184
triallate	S-(2,3,3-trichloroallyl) diisopropylthiocarbamate	115
triclopyr	[(3,5,6-trichloro-2-pyridinyl)oxy] acetic acid	4, 5, 6, 11, 12, 20, 183
trifluralin	α,α,α-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine	2, 3, 7, 8, 37, 45, 56, 68, 87, 102, 116, 120, 138, 139
2,4-D	(2,4-dichlorophenoxy)acetic acid	4, 5, 6, 11, 12, 16, 20, 26, 27, 29, 30, 31, 32, 37, 59, 111, 178, 184
2,4,5-T	(2,4,5-trichlorophenoxy)acetic acid	20
USB-3153	See prodiamine	
VEL-4207	Unavailable	4, 5, 6, 11
VEL-4359	Unavailable	4, 11
VEL-5026	Unavailable	95, 100, 108, 122, 167
VEL-5052	2-chloro-N-(2,6-dimethyl=phenyl)-N-[(1,3-dioxolan-2-yl)methyl] acetamide	63, 120, 143
Velpar	3-cyclohexyl-6-(dimethylamino)-1-methyl-s-triazine-2,4(1H,3H) dione	13
vernolate	S-propyl dipropylthiocarbamate	132
weed oil		104

SURFACTANTS

ABBREVIATIONS USED IN THIS REPORT

A	acre(s)
a.i.	active ingredient
a.e.	acid equivalent
aehg	acid equivalent/hundred gallons
bu.	bushel(s)
C	degrees Centigrade
cm.	centimeter(s)
cwt	100 pounds
F	degrees Fahrenheit
fps	feet per second
ft.	foot or feet
gal	gallon(s)
gpa	gallons per acre
gpm	gallons per minute
ha.	hectare
hr.	hour(s)
in.	inch(es)
kg.	kilogram(s)
l	liter(s)
lb.	pound(s)
m	meter(s)
min	minute(s)
ml.	milliliter(s)
mph	miles per hour
oz.	ounce(s)

ABBREVIATIONS USED IN THIS REPORT (continued)

ppb . . . . parts per billion

ppm . . . . parts per million

psi . . . . pounds per square inch

pt. . . . . pint

sq. . . . . square

sq ft . . . . square feet

rd. . . . . rod

wt. . . . . weight

WA. . . . . wetting agent