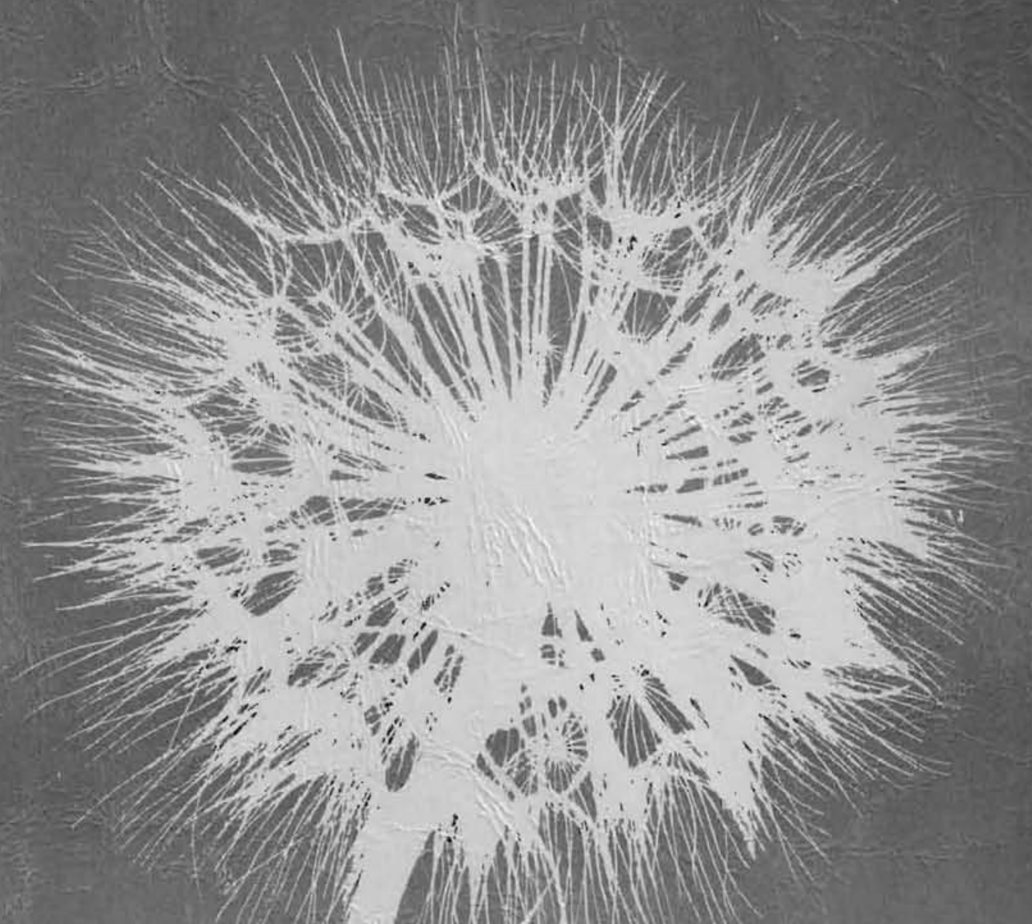
Howard L Morton

Research Progress Report



WESTERN SOCIETY OF WEED SCIENCE
Phoenix, Arizona
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FORWARD

The 1975 Annual Research Progress Report of the Western Society of Weed Science consists of summaries and abstracts of recent investigations in weed research. These reports were submitted voluntarily by the Society's members who are engaged in research, extension, regulatory and commercial work. This report will be supplemented by the Proceedings from the Western Society of Weed Science meeting to be held in March 1975 at Phoenix, Arizona.

The Research Committee consists of seven Research Project Chairmen and a Committee Chairman. The assembling and summarizing of information in each of the seven areas was the responsibility of the Project Chairman. All reports were edited for conformity as to chemical and weed nomenclature, abbreviations, and for corrections of obvious errors. Information contained in the Research Progress Report should be considered tentative and NOT FOR PUBLICATION. 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 herbicides, nor does it imply that the uses discussed in the text are registered by the Environmental Protection Agency. Registered trade names used occasionally for informative purposes do not imply endorsement of any commercial product by 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 were used. The common names of herbicides follow the report of the Terminology Committee of the Weed Science Society where possible. Only the common names of weeds and herbicides are given in the text. The scientific names of weeds and the full chemical names of herbicides, if known, are listed in the indices on pages 119-141.

The Research Committee extends their gratitude to all those who have contributed reports on their research and findings. The Chairman also extends his thanks to each Research Project Chairman for assembling and summarizing his section and meeting the deadline imposed upon him.

Richard D. Comes
Chairman, Research Committee
Western Society Weed Science

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PROJECT 1. PERENNIAL HERBACEOUS WEEDS

A. F, Gale, Project Chairman

SUMMARY

Papers were submitted concerning Canada thistle, field bindweed, yellow toadflax, bermudagrass and johnsongrass control.

Fall applications of glyphosate to Canada thistle and field bindweed regrowth resulted in excellent control of both species. No differences were observed between three rates of glyphosate or dates of treatment as far as reduction in the stand of Canada thistle. Barley yields obtained from the glyphosate treated areas were 3 to 5 times greater than from the non-treated areas. Previous reports have indicated that maximum growth and leaf development is desirable to obtain maximum activity with glyphosate.

Excellent control of Canada thistle was obtained using several rates of DD and telone applied to the soil subsurface with a noble blade.

Two identical experiments were established to test several herbicides on two fall treatment dates for Canada thistle control. The performance of all herbicides applied on the earlier fall date were superior. All treatments gave some control and apparent stand reduction. Canada thistle control obtained with M-3785 was not permanent and recovery was apparent. Granular picloram gave excellent control at the higher rates. Combinations of dicamba and chlorflurenol appeared to offer promise for Canada thistle control. Data show that metribuzin was a successful treatment.

Several herbicides were tested for control of yellow toadflax. Excellent control was obtained with picloram at rates used in the trial. Poor yellow toadflax control was obtained with other herbicides at the rates of application used in the test.

Glyphosate applied at three rates and at 2 or 3 month intervals to bermudagrass effectively reduced the size of plants. The low rate of glyphosate used in the test was more effective when applied at the 2 month interval. None of the treatments reduced the number of plants with topgrowth.

Dalapon and glyphosate applied every 8 weeks and paraquat applied every 2 weeks beginning in April were tested to determine bermudagrass responses. The death of topgrowth and following regrowth was much faster with paraquat than with dalapon or glyphosate. No herbicide treatments killed all bermudagrass plants in a single season. The best control in June was obtained with four applications of paraquat. By August, all herbicides had effectively reduced the size of bermudagrass clumps.

Three rates of glyphosate were applied to johnsongrass at 2 or 3-month intervals to determine their effectiveness. A single application of 2 to 3 lb/A of glyphosate in April effectively reduced the number of plants with topgrowth and the number of stems per growing plant within 2 months. Despite the effectiveness of the first application, two and three applications at 2 and 3-month intervals failed to control all johnsongrass plants.

Fall application of glyphosate for Canada thistle and field bindweed control and resulting barley yields. Alley, H. P., G. A. Lee and G. L. Costel. A heavily perennial weed infested dryland field which had been clean cultivated during the 1973 growing season was selected for the study site. At the early September 12, 1973 treatment date a majority of the Canada thistle had recovered, emerged and had 2-3 inch rosettes; some plants emerged after treatment. Field bindweed had 2-3 inches top growth. The limited amount of top growth, and new emerging plants following the early treatment date prompted a near duplicate set of plots on Canada thistle. These plots were sprayed October 6, 1973.

All applications were approximately two acres in size, non-replicated. Glyphosate was applied in 17 gpa water with a power-driven ground rig. Spring barley was planted across all treatments.

Visual weed control evaluations and barley harvest for yield determinations were made on August 15, 1974.

There was no apparent difference between the three rates of application or dates of treatment as far as reduction in the stand of Canada thistle or field bindweed was concerned. The competitiveness of perennial weeds, Canada thistle and field bindweed, toward barley production is borne out in the attached table. The non-treated plots received no chemical treatment.

Barley yields obtained from the glyphosate treated plots were 3 to 5 times greater than from the non-treated areas.

The results of this research is of special interest as it was previously thought and reported that maximum growth and leaf area development, which is common during bud or past bloom stage of growth, was essential for maximum activity of this compound.

Fall application of glyphosate to Canada thistle and field bindweed after crop removal and/or a clean fallow program could be envisioned as a program whereby perennials could be effectively controlled with no limitations to subsequent cropping systems caused by soil persistence of the herbicide. (Wyoming Agric. Expt. Sta., Laramie. SR-631.)

Perennial weed control and barley yields from fall treatment with glyphosate

Treatment	Rate/Aai	Percent control	Yield bu/A
	Canada thistle 9/12/73[1]		
glyphosate	1.0	99	36.4
glyphosate	2.0	100	43.6
glyphosate	3.0	100	54.6
check	-	-0-	11.4
	Canada thistle 10/6/73		
glyphosate	2.0	100	48.8
glyphosate	3.0	100	54.2
	Field bindweed 9/12/73		
glyphosate	3.0	99	44.2
check	-	-0-	22.8

[1]Dates of herbicide application.

Subsurface layering of soil fumigants and resultant control of Canada thistle. Alley, H. P. and G. A. Lee. An area which had been clean cultivated during the 1973 growing season was selected for the fumigation study. The Canada thistle had recovered from the previous cultivations and was in the 6 to 8 inch rosette at time of treatment.

A noble blade was fitted with nozzles and other necessary adaptations for subsurface layering of the fumigants. The two fumigants, DD and telone were applied at 20, 40 and 60 gpa in a total volume of 75 gpa diesel oil and fumigant. Soil temperature was 35°F. The loose soil created by the noble blade was compacted, within 30 minutes of application, with a roller-packer unit.

There was no apparent visual difference between rates or fumigant used. All treated areas were free of Canada thistle growth during the 1974 growing season. Annual broadleaf weeds were abundant by mid-season.

With the effectiveness of the lowest rates of application further research utilizing lower rates of subsurface layering is planned. (Wyoming Agric. Expt. Sta., Laramie, SR-629.)

Canada thistle control. Zimdahl, R. L. and J. M. Foster. Because of our 1973 results three new experiments were established. Experiments A and B were identical and Experiment C was designed to evaluate only one herbicide. The herbicides were applied in 20 gpa when the thistles were in the rosette stage. There was no crop grown and no irrigation water was applied to any of the fields. Soil and air temperatures were about 60F. The soil analysis and date of application are shown in Table 1. It is important to note the difference of one month in application date between Experiments A and B. We are quite sure this accounts for the difference in herbicide performance observed.

The data in Table 2 include the treatments, stand counts, and visual control ratings. The stand counts are shown as a percent of the count at the time of establishment. A comparison of the stand counts or visual control ratings for Experiments A and B show the superior performance of all herbicides in Experiment B which was applied on September 27. Good growing conditions existed for at least five weeks after application whereas a severe frost terminated growth soon after Experiment A was established. Thus, there was limited time for herbicidal translocation and activity.

The results from Experiment B are most encouraging. The control data show that an increase in stand from the fall counts to the May count was normal and that due to competition the number of plants then decreased to an optimum for each site. All treatments gave some control and apparently permanent stand reduction. M-3785 did not have a lasting effect and recovery was apparent. It was also noted that this herbicide had no activity against kochia.

Granular picloram gave excellent control at the higher rates. It was difficult to achieve uniform distribution of the 0.25 lb rate.

Glyphosate alone gave good, but not lasting, control which is not unexpected in view of its contact activity. Fall applications were definitely superior. Combination with metribuzin (applied separately) did not significantly improve the performance of either.

Dicamba + 2,4-D performed as expected by giving some control. However, the combination of dicamba and chlorflurenol (a plant growth regulator) in Experiment B was superior. Both rates of dicamba were effective with the higher rate being preferred. Spring applications of the same combinations have not been as satisfactory. Combinations of dicamba and chlorflurenol appeared to offer real promise for good control of thistle.

The data show that metribuzin at 2 and 4 lb/A was the most successful treatment. The action of metribuzin was apparent in May in that the thistles were yellow and stunted. As shown by the stand count, which decreased throughout the season, death occurred late in the season. (Weed Research Laboratory, Dept. of Botany and Plant Physiology, Colorado State Univ., Fort Collins.)

Table 1. Soil analysis, initial stand count, and dates of herbicide application for experiments established in the fall of 1973

Experiment	Date of herbicide application	Initial stand count	Soil analysis % sand	silt	clay	O.M.	CEC Meq/100g	pH
A	10/25	5.2	22	24	54	1.7	24.6	7.9
B	9/27	5.9	39	23	38	1.7	15.4	8.1
C	10/25	7.9	23	30	47	1.2	23.2	7.9

Table 2. Herbicides, Canada thistle stand counts, and visual control ratings

Herbicide	Rate lbs ai/A	Experiment	Stand count[1/] 5/7	6/4	6/26	9/4	Visual[2/] control rating
M-3785	0.39	A	250	272	320	169	43
		B	34	105	136	143	35
	0.78	A	42	50	82	58	65
		B	0	20	41	70	78
glyphosate	1.5	B	14	57	114	89	63
	3.0	B	2	18	41	61	71
dicamba +	0.5+	A	51	167	167	65	61
2,4-D	1.0	B	28	100	125	125	56
dicamba +	1.0+	A	9	155	227	136	56
cholor-							
flurenol	0.66	B	0	105	24	32	88
	2.0+	A	5	223	382	263	54
	0.66	B	0	0	5	13	96
metribuzin	2.0	A	339	173	107	63	49
		B	55	25	20	5	84
	4.0	A	645	200	132	55	61
		B	117	30	27	0	87
metribuzin +	2.0+	A	619	448	290	214	41
glyphosate	1.5	B	29	57	14	14	89
picloram	0.25	A	193	127	137	95	37
		C	58	59	63	37	72
	0.5	A	83	50	37	40	81
		C	11	10	11	6	90
	1.0	A	31	39	47	10	89
		C	3	0	5	0	97
control		A	444	288	319	165	
		B	142	136	132	129	
		C	187	149	154	153	

[1/] Counts, shown as percent of the count at the time of establishment, are an average of four replications with 2-2 sq ft counts per plot.

[2/] 0 = no control, 100 = complete kill. Ratings are an average of four reps. over all dates.

Yellow toadflax control. Alley, H. P., G. A. Lee and A. F. Gale. A replicated series of plots were established on June 23, 1973 to evaluate the effectiveness of picloram, silvex, dicamba and GK-40 for yellow toadflax control. Yellow toadflax is becoming a serious problem on both cultivated small grain producing areas and rangeland areas of northwestern Wyoming. These plots were established on non-cultivated land adjacent to small grains production field.

All treatments were applied with a three-nozzle knapsack spray unit in a total volume of 40 gpa water. Yellow toadflax was in the early bud to bloom stage of growth at time of application.

Control evaluations were made June 4, 1974, approximately one year following treatment. Picloram at an application rate of 2, 3 and 4 lb/A were the only treatments included in the trial that gave effective control. All three rates reduced the stand by 98 percent. Dicamba and silvex applied at 6 lb/A reduced the stand by only 40 percent. GK-40 at 2 gal/A gave no control. (Wyoming Agric. Expt. Sta., Laramie, SR-632.)

Yellow toadflax control

Treatment	Rate/A[1/]	Percent control and observations
picloram	2.0	98 - remaining plants badly damaged
picloram	3.0	98 - remaining plants badly damaged
picloram	4.0	98 - remaining plants badly damaged
silvex	6.0	40 - plants healthy
dicamba	6.0	40 - plants healthy
GK-40	2 gal	0 - not apparent activity

[1/] Rates are expressed as pounds active ingredient except GK-40 which is gpa.

Response of bermudagrass to three rates of glyphosate applied at two intervals. Hamilton, K. C. Common bermudagrass plants spaced 10 by 15 feet apart were established by planting rhizome segments from a single plant in the spring of 1973 at Tucson, Arizona. During the first year seed heads were removed by mowing. Low rates of trifluralin and diuron were applied to the soil to control annual weeds.

Plants covered an estimated 13 square feet of ground when treatments started. Starting April 23, 1974, 1, 2, and 3 lb/A of glyphosate in 25 gpa of water was applied at 2 and 3-month intervals until October. 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. Irrigation was similar to that used for cotton.

The response of bermudagrass to glyphosate required 2 to 4 weeks to become evident in April, June, and July. No treatment reduced the number of plants with topgrowth (see Table). Applications at the 2-month intervals were more effective than applications at 3-month intervals in reducing the size of plants. There was little difference in the effectiveness of 2 and 3 lb/A of glyphosate. One lb/A of glyphosate was more effective when applied at the 2-month interval, which included an application in August, than when applied at the 3-month interval. (Ariz. Agr. Exp. Sta., Tucson.)

Bermudagrass plants with topgrowth and area covered by live topgrowth after applications of glyphosate at Tucson, Arizona in 1974

Treatments		Date of observation				
lb/A	Months between treatments	4/23	6/17	7/15	8/12	10/7
		Plants with topgrowth				
1	2	16	16	16	16	16
2	2	16	16	16	16	16
3	2	16	16	15	16	15
1	3	16	16	16	16	16
2	3	16	16	16	16	16
3	3	16	16	16	16	16
		Square feet per growing plant				
1	2	6.9	9.8	9.7	12.8	1.1
2	2	13.3	10.8	3.9	3.0	.2
3	2	11.5	9.0	.7	1.0	.2
1	3	7.1	9.8	14.9	21.9	89.6
2	3	13.2	4.7	5.6	9.6	21.0
3	3	27.8	5.0	7.4	4.0	12.4

Response of bermudagrass to foliar applications of three herbicides. Hamilton, K. C. Common bermudagrass plants spaced 10 by 15 feet apart were established by planting rhizome segments from a single plant in the spring of 1973 at Tucson, Arizona. During the first year, seed heads were removed by mowing. Low rates of trifluralin and diuron were applied to the soil to control annual weeds. Irrigation was similar to that used for cotton.

Plants covered an estimated 5 sq. ft. when treatments started in the spring of 1974. Starting April 23, 1974, (a) 2 lb/A of glyphosate and (b) 20 lb/A of dalapon in 25 gpa of water were each applied every 8 weeks, and (c) 0.5% paraquat in 80 gpa of water was applied every 2 weeks. A blended surfactant (0.5%) was added to the dalapon and paraquat sprays.

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.

The death of topgrowth and following regrowth was much faster with paraquat than with dalapon or glyphosate. No herbicide killed all bermudagrass plants in a single season. The best control in June was with four applications of paraquat (see table). By August, all herbicides had reduced the size of bermudagrass clumps by 80 to 98 percent. By October, all plants treated with dalapon and glyphosate were growing but only nine plants treated with paraquat had regrowth. Dalapon gave less control of bermudagrass than either glyphosate or dalapon. (Arizona Agr. Exp. Sta., Tucson.)

Bermudagrass plants with topgrowth and area covered by live topgrowth after foliar applications of three herbicides

Treatments			Date of observation			
Herbicide	Rate	Weeks between treatments	4/23	6/17	8/12	10/7
			Plants with topgrowth			
glyphosate	2 lb/A	8	16	16	13	16
dalapon	20 lb/A	8	16	16	16	16
paraquat	0.5%	2	16	16	13	9
			Square feet per growing plant			
glyphosate	2 lb/A	8	4.2	4.2	.6	.2
dalapon	20 lb/A	8	6.2	3.9	1.3	1.1
paraquat	0.5%	2	4.2	1.1	.1	.1

Response of johnsongrass to three rates of glyphosate applied at two intervals. Hamilton, K. C. Two strains (E8 and E20) of johnsongrass were established in the spring of 1973 at Tucson, Arizona. Ninety-six plants of each strain were established by planting rhizome segments at 10-foot intervals in rows 15 ft apart. During 1973, plants were maintained vegetatively by mowing. Low rates of trifluralin and diuron were applied to the soil to control annual weeds.

Plants averaged 68 stems when treatments were started in the spring of 1974. Starting April 23, 1974, when plants were flowering, 1, 2, and 3 lb/A of glyphosate was applied at 2 or 3 month intervals until October. Glyphosate was applied in 25 gpa of water. Some plants were flowering at each treatment date. Each plot contained four plants and treatments were replicated four times on each strain. The number of living stems on each plant was estimated before each treatment. Irrigation was similar to that used for cotton.

There was no difference in the response of the two johnsongrass strains to glyphosate so the combined data for strains are reported (see table). A single application of 2 or 3 lb/A of glyphosate in April reduced the number of plants with topgrowth by 94 percent and the number of stems per growing plant by 90 percent 2 months later. Despite the effectiveness of the first application two and three applications at 3 and 2-month intervals failed to control all johnsongrass plants. There was no difference in the effectiveness of 2 and 3 lb/A applications. (Ariz. Agr. Exp. Sta., Tucson.)

Johnsongrass plants with topgrowth and number of stems per growing plant after applications of glyphosate at Tucson, Arizona in 1974.

Treatments		Date of observation				
lb/A	Months between treatments	4/23	6/17	7/15	8/12	10/7
		Plants with topgrowth				
1	2	32	10	12	18	7
2	2	32	1	0	2	1
3	2	32	1	1	2	1
1	3	32	10	18	20	19
2	3	32	3	2	1	2
3	3	32	3	3	1	2
		Stems per growing plant				
1	2	68	10	7	12	2
2	2	62	1	0	2	15
3	2	71	10	0	16	20
1	3	79	6	13	12	35
2	3	56	3	16	2	12
3	3	70	10	32	1	27

PROJECT 2. HERBACEOUS WEEDS IN RANGE AND FORESTS

Roland Schirman, Project Chairman

SUMMARY

Only one paper from Washington was submitted for the Progress Report. In a roadside seeding study, initial stands of seeded grasses were best on plots that were raked before and after seeding or rolled after seeding. Grass stands in other treatments improved with time.

Roadside seeding study. Swan, D. G. Vegetation management, beyond the shoulder on roadsides, is the most practical weed control method. Objective of this study was to determine if weed infested roadsides could be converted to desirable species by methods similar to new road seedings without mechanical seedbed preparation.

A central Washington site with 10 inches annual precipitation was chosen. To increase available moisture the site was chemical fallowed. In November, 1 year prior to seeding, the area was treated with atrazine at 0.4 lb/A plus amitrole-T at 0.5 lb/A. Surviving weeds, depending upon number and species, were sprayed with 2,4-D, glyphosate or hand-hoed the following spring or summer.

To help reduce the weed competition problem, fall seeding was delayed until autumn rains brought on the first flush of weeds. These were controlled with paraquat or glyphosate prior to seeding. A mixture of Nordan crested wheatgrass plus Sherman big bluegrass was used. The site was fertilized with 40 lb/A ammonium sulfate and the grass was broadcast with a cyclone seeder. The mulch treatment was a sawdust-chip mixture and netting was a biodegradable type. Rolled plots were rolled in two directions at right angles with a corrugated field roller. A garden rake was used for the raked plots.

A second, but fewer, crop of weeds always emerged with the grass. Broadleaf weeds, including horseweed, fiddleneck, tumble mustard and prickly lettuce, were controlled with an application of bromoxynil at 3/4 lb/A. Downy brome could not be selectively controlled. Mowing merely caused the downy brome to retiller and maturity was delayed. Fertilizer was applied to the established grass every second or third year. This was the only maintenance performed.

Results are shown in the table. Grass stands were initially better in the raked-broadcast-raked and broadcast-rolled treatments. Stands in other treatments generally improved with time and as grass stand improved, weed control increased. A poor stand resulted from below normal

precipitation in the 1972-1973 seeding and establishment year.
(Washington Agricultural Exp. Station, Wash. State Univ., Pullman.)

Percentage grass stand and weed control in roadside seeding study

Seeding method	Grass stand 1971	Grass stand 1972	Grass stand 1973	Downy brome control 1971	Downy brome control 1972	Downy brome control 1973	Broadleaf control 1971	Broadleaf control 1972	Broadleaf control 1973
				Percent					
				Seeded November 1970					
broadcast	60	80	100	20	100	100	20	100	100
broadcast & mulched	80	80	100	50	100	100	70	90	100
broadcast, mulched & netted	80	80	100	40	100	100	80	100	100
raked, broadcast & raked	90	100	100	60	100	100	90	100	100
				Seeded November 1971					
broadcast	--	70	80	--	80	100	--	100	100
broadcast & mulched	--	80	90	--	80	100	--	100	100
broadcast & rolled	--	100	100	--	90	100	--	100	100
broadcast, rolled & mulched	--	90	100	--	80	100	--	100	100
raked, broadcast & raked	--	90	100	--	80	100	--	100	100
				Seeded November 1972					
broadcast	--	--	10	--	--	30	--	--	100
broadcast & rolled	--	--	20	--	--	30	--	--	100
raked, broadcast & rolled	--	--	40	--	--	80	--	--	100
raked, broadcast & raked	--	--	30	--	--	80	--	--	100

PROJECT 3. UNDESIRABLE WOODY PLANTS

Steven R. Radosevich, Project Chairman

SUMMARY

Seven progress reports were submitted by six authors. These reports represented work underway in five states.

Release of coniferous trees from brush competition was of concern. Radosevich and Scarlett noted significant increases in white fir population above the brushline of greenleaf manzanita and snowbrush ceanothus previously treated with several herbicides. Gratkowski and Stewart observed that 2,4,5-T applications with drift-reducing agents were slightly less effective than applications without drift-reducing agents for tanoak, vine maple, and snowbrush ceanothus control. No injury was noted to young Douglas-fir.

Stewart and Gratkowski also compared karbutilate and repeated applications of 2,4-D + 2,4,5-T for conversion of brush laden-land to forest. They noted effective control of several woody species, including Douglas-fir, with karbutilate.

Brush control for improved rangeland, recreational use, or fire protection was also of interest. Alley and Lee compared karbutilate, picloram and several other candidate herbicides for greasewood control. Best control and least injury to desirable plants was noted with picloram. Radosevich and associates studied applications of several soil and foliage active herbicides for chamise control. After 18 months tebuthiuron and glyphosate were effectively controlling this brush species. McHenry and associates determined that glyphosate and silvex were superior to asulam for pacific poison oak control.

Davis studied karbutilate residues in run-off water from a treated chaparral watershed. The results of this five-year study indicated non-detectable levels of karbutilate, except following heavy rains the year of application. Following storms the initial year low levels of karbutilate were found.

<u>Control of snowbrush ceanothus and greenleaf manzanita in a stand of small conifers.</u> Radosevich, S. R. and A. L. Scarlett. Undesirable brush species can severely reduce growth of young conifers attempting to reestablish on many clear-cut or burned-over areas of California's potential timberland. A study was initiated on September 28, 1972 to compare the effectiveness of 2,4-D ester, 2,4,5-T ester, and glyphosate for the control of greenleaf manzanita and snowbrush ceanothus growing in a stand of white fir. Treatments were applied in 3.7 GPA using a backpack

mistblower. Plot size was 880 ft^2. Three replications were used. Diesel oil was used at 1 gal/A in the 2,4-D and 2,4,5-T treatments. At the time of application foliage was wet from rainfall the previous two days. Brush was 4 to 5 feet tall. All plots were visually evaluated for brush control and tree injury twice annually (6/5/73, 10/2/73, 5/28/74, 10/9/74). In addition the number of white fir above and below the brush line was determined at each evaluation date.

Control of manzanita was acceptable with 2 or 4 lb of 2,4-D or 4 lbs of 2,4,5-T. White fir exhibited phytotoxicity from both herbicides. Control of snowbrush ceanothus was poor one year after application of either phenoxy herbicide. Glyphosate was somewhat opposite, giving acceptable control of snowbrush ceanothus at the 4 and 8 lb/A level, usually less response was noted on manzanita. Injury to white fir was substantially less with glyphosate than with either phenoxy herbicide.

It is important to note that at the time of application only about 20 trees were above the brushline in the experimental area and trees in the understory were observed with difficulty. Two years after treatment 74 trees existed above the brushline and an additional 54 trees could be easily seen. Trees present in the control plots were observed with difficulty.

While this trial is continuing to evaluate the full effectiveness of each herbicide treatment these results indicate that significant competition release of conifers from brush may be possible by applications of 2,4-D ester, 2,4,5-T ester, or glyphosate. (Univ. of Calif., Dept. of Botany, Davis and Cooperative Extension, Plumas Co., CA.)

Table 1. Number of white fir above and below brush treated with three foliage active herbicides

Herbicide	Rate lb(ai)/A	10/2/73 Above	10/2/73 Below	10/9/74 Above	10/9/74 Below
2,4-D(ester)+oil	2	1	15	11	6
2,4-D(ester)+oil	4	3	12	11	8
2,4,5-T(ester)+oil	2	1	8	5	5
2,4,5-T(ester)+oil	4	0	16	3	6
glyphosate	2	3	20	8	11
glyphosate	4	11	11	21	5
glyphosate	8	3	7	8	3
control	-	6	15	7	11
total		28	104	74	54

Table 2. Response of snowbrush ceanothus, greenleaf manzanita and two coniferous tree species to three foliage applied herbicides

		PERCENT CONTROL									
	Rate	Greenleaf manzanita				Snowbush ceanothus				White fir	
Herbicide	lb(ai)/A	6/5/73	10/2/73	5/28/74	10/9/74	6/5/73	10/2/73	5/28/74	10/9/74	6/5/73	10/2/73
2,4-D(ester) +oil	2	57	73	95	100	57	20	43	0	20	23
2,4-D(ester) +oil	4	70	83	90	100	83	50	43	27	20	50
2,4,5-T(ester) +oil	2	80	53	60	73	93	43	47	17	9	13
2,4,5-T(ester) +oil	4	83	83	93	100	96	70	50	33	22	38
glyphosate	2	37	17	30	33	70	20	30	13	3	2
glyphosate	4	63	23	63	67	65	73	67	57	7	5
glyphosate	8	65	30	40	63	95	78	83	87	10	7
control	-	0	0	0	3	0	0	0	0	0	0

Effectiveness of foamed sprays on Douglas-firs and associated brush species. Gratkowski, H. and R. Stewart. Accurate placement of aerial sprays is necessary when applying herbicides on forest land adjacent to other ownerships or near ecologically sensitive areas. For example, recently enacted forest practice laws in Oregon require that unsprayed buffer strips be left on each side of streams and waterways in sprayed areas. Project-scale trials showed that foamed sprays drastically reduce drift and insure accurate placement of aerial sprays, but the larger droplets also reduce coverage and could affect the degree of brush control obtained with low volume (10-gallon per acre) aerial sprays.

To determine whether this occurs, two cuttings were sprayed during mid-April 1973 to release young Douglas-firs from snowbrush ceanothus on the Umpqua National Forest near Roseburg, Oregon. Three cuttings were also sprayed to release Douglas-firs from tanoak on the Siskiyou National Forest near Brookings, Oregon. One half of each cutting was sprayed with a standard oil-in-water emulsion; the other half was sprayed with the same formulation with a foaming agent added. Treatments were as follows:

Snowbrush ceanothus

1. 2 lb ae BOE esters of 2,4,5-T/A
2. 2 lb ae BOE esters of 2,4,5-T plus 3 qt Foamspray(R)/A

Tanoak

3. 3 lb ae BOE esters of 2,4-D/A
4. 3 lb ae BOE esters of 2,4-D plus 3 qt Accutrol(R)

All herbicides were applied in oil-in-water emulsions containing 1/2 gal of diesel oil in 10 gal of spray/A. Standard emulsions were applied with D8 jet nozzles. Foamspray was applied through Delavan D6-46 row crop nozzles and Accutrol with Accutrol 842 aerial coarse nozzles. All nozzles were directed back at 45° angle from the horizontal to insure some breakup of spray droplets.

Briefly, young Douglas-firs were not damaged by any of the sprays. This was as expected, for season of application was selected to insure the trees would not be damaged. However, foamed sprays were slightly less effective than the same herbicides applied in normal oil-in-water emulsions on snowbrush ceanothus, vine maple and tanoak. Reduced effects are tentatively attributed to reduced coverage of shrubs by the smaller number of large foam droplets. Volume of foamed sprays may need to be increased to 15 gal per acre to obtain adequate coverage and brush control comparable to that attained with standard oil-in-water emulsion carriers. (Pacific N.W. Forest and Range Exp. Stn., Forest Service, U. S. Dept. of Agric., Roseburg, Oregon.)

Karbutilate and repeated phenoxy sprays for reclamation of red alder brushfields. Stewart, R. E. Approximately 2.4 million acres of high site forest land in western Oregon and Washington are currently occupied by brushfields dominated by red alder. These communities often contain 50 to 100 tons dry weight of herbaceous and woody species arranged in three strata: an overstory of low value hardwoods or mixed hardwoods and conifers, a dense shrub layer, and a herbaceous layer dominated by western swordfern. Present methods for converting these stands to more valuable conifers are either expensive or only partially successful.

Earlier studies of nonselective, soil-active herbicides suggested that karbutilate would control many of the major undesirable species in red alder brushfields. To determine the effectiveness of this herbicide, granular and wettable powder formulations of karbutilate were compared with repeated applications of phenoxy herbicides in aerial spray tests. Six 5-acre plots were established in 15- to 20-year-old red alder stands near Mapleton and Elk City, Oregon and near Adna, Washington. In April of 1974, one of the following treatments was applied to each plot at all three locations:

1 - untreated (control)
2 - 1-1/2 lb ae each of BOE esters of 2,4-D and 2,4,5-T in 10 gal diesel oil per acre
3 - 10 lb ai karbutilate granular formulation per acre
4 - 15 lb ai karbutilate granular formulation per acre
5 - 10 lb ai karbutilate wettable powder formulation per acre
6 - 15 lb ai karbutilate wettable powder formulation per acre

An additional 5-acre plot was treated with 15 lb ai karbutilate wettable powder per acre at Silverton, Oregon and 15 lb ai karbutilate granular at Longview, Washington. This provided three replications of all treatments and one additional replication of the high rates of karbutilate wettable powder and granular formulations.

Defoliation on 30 red alder trees in each plot was estimated in early September of 1974, 5 months after treatment. In addition, defoliation was also recorded for all other species occurring within 20 feet of each sampled tree. These preliminary results indicate that karbutilate is effective on many woody species including conifers (see table). Further, 15 lb ai of karbutilate is more effective than 10 lb, and the wettable powder formulation is better than the granular formulation. Karbutilate effects develop more slowly than those obtained with phenoxy herbicides. Two or three resprays of the phenoxy herbicide plots are planned during the next two years. Therefore, comparisons between karbutilate and phenoxy sprays are not appropriate at this time.

All plots will be planted with Douglas-fir seedlings at various intervals after treatment to determine the residual activity of the herbicides and the effectiveness of these treatments for reclamation. (Pac. Northwest Forest and Range Exp. Stn., U. S. Forest Serv., Corvallis, Oregon.)

First-year defoliation of major tree, shrub, and forb species in red alder stands after aerial application of phenoxy sprays or karbutilate

Species	Untreated	Phenoxy spray	Karbutilate granular		Karbutilate wettable powder	
			10 lb	15 lb	10 lb	15 lb
	Percent defoliation					
Trees						
red alder	0	64	51	55	45	81
bigleaf maple	0	23	14	28	5	34
bitter cherry	0	7	14	33	26	69
Douglas-fir	0	0	12	11	8	22
Shrubs						
salmonberry	4	8	57	56	49	96
western thimbleberry	0	30	82	46	28	76
vine maple	0	77	2	13	8	30
California hazel	0	27	10	20	19	48
tall red huckleberry	0	62	11	8	22	34
elder (*Sambucus* spp.)	0	18	50	76	45	83
salal	0	1	0	2	3	17
Forbs						
western swordfern	0	14	38	38	50	69

Herbicide evaluation for the control of greasewood and effect upon associated vegetation. Alley, H. P. and G. A. Lee. An area heavily infested with greasewood was selected for the study site. There was a good stand of alkali sacaton, redtop, bluegrass and spot infestations of broadleaf plantain growing in the plots at time of treatment.

Treatments were applied July 30, 1973 to greasewood that had flowered and showed approximately 6 inches new twig growth.

Karbutilate, at the rates applied, caused only minor damage with very little greasewood kill, but resulted in damage to alkali sacaton. All other herbicide treatments, except picloram, severely reduced the stand of native grasses and/or completely bared the area of any vegetation. These compounds could not be considered as possible candidates for greasewood control on account of their apparent phytotoxicity to the associated grass species. They could be candidates for soil sterilization. Picloram at the 0.5 and 1.0 lb/A rate of application gave 98 and 99 percent control of greasewood, respectively, without any damage to the grass species. (Wyoming Agric. Expt. Sta., Laramie, SR-624.)

Greasewood control and herbicide effect upon associated vegetations

Treatment[1/]	lb/A	Percent control	Observations[2/]
karbutilate	0.5	0	some leaf malformations, no damage to associated vegetation
karbutilate	1.0	20	some leaf fall--damage to alkali sacaton
karbutilate	1.5	50	leaf fall and damage to alkali sacaton
picloram	0.5	98	no damage to associated vegetation
picloram	1.0	99	no damage to associated vegetation
DS 17338	2.0	50	leaf fall and damage to alkali sacaton
DS 17338	4.0	80	very severe--near complete bare ground
DS 17338	8.0	90	bare ground
DS 18507	2.0	0	leaf malformation--bare ground
DS 18507	4.0	50	bare ground
DS 18507	8.0	95	bare ground
R 24191	5.0	60	took out the grass
R 24191	10.0	90	near bare ground

[1/]Formulations -- karbutilate pellets, picloram 5G, DS 17338, 2 lb/gal E.C., DS 18507 80% WP, and R 24191 50% WP.

[2/]Evaluations made 7/2/74.

Control of mature chamise with soil and foliar applied herbicides. Radosevich, S. R., R. J. Mullen and W. Graves. A site heavily infested with old growth chamise was selected to evaluate the effects of two soil-active and four foliage active herbicides. Soil-active materials consisted of tebuthiuron and bromacil applied as a wettable powder and granular formulation. In addition tebuthiuron was tested as bolus (large pellets), applied in rows with each bolus being 5 feet apart (1 bolus/25 feet^2). Granular formulations were applied by hand, a CO_2 sprayer was used for spray applications. Bromacil and tebuthiuron applications were made December 20, 1972. Glyphosate, a foliage active material, was also applied at that time. Rainfall for the season following application totaled about 15 inches.

On May 10, 1973 the following foliar applications were made: 2,4-D ester, 2,4,5-T, and silvex each with either diesel oil or isoparaffinic oil; 2,4-D + 2,4,5-T plus diesel oil, and glyphosate. Four replications were used. Plot size was 440 ft^2 (.001 acre), and treatments were applied in a spray volume of 50 gpa. The soil consisted of 0.15% O.M., 12% clay, 26% silt, and 62% sand.

All treatments were visually evaluated for chamise control and grass and forb injury on November 9, 1973 and November 5, 1974. The results of these evaluations are presented in the following table.

Tebuthiuron exhibited greater control of chamise than did bromacil. Wettable powder formulations were slightly better than granules. Tebuthiuron bolus applications were expected to reduce the amount of toxicity to grass and forbs while still giving control of chamise. This did not prove to be the case as control of chamise was reduced while toxicity to grass was only slightly lessened. Glyphosate applied in December gave excellent control of chamise, however, it also injured grass and forbs.

Phenoxy herbicides applied in May and evaluated 18 months later provided poor control of mature chamise. A spring application of glyphosate (1.5 lb/A) is providing excellent control with no phytotoxicity to grasses and forbs. The 12 lb/A rate of glyphosate was found to reduce grass and forb stands. This injury is believed to occur from soil activity of the herbicide. (Botany Dept., Univ. of Calif., Davis and Cooperative Extension, San Diego, Co., CA.)

Chamise control by several soil and foliage active herbicides

Herbicide	Rate lb(ai)/A	Formu- lation	Time of applic.	Percent control Chamise 11/9/73	Chamise 11/5/74	Grass and Forbs 11/9/73	Grass and Forbs 11/5/74
tebuthiuron	3	80 wp	W	77	75	100	100
tebuthiuron	12	80 wp	W	100	100	100	100
tebuthiuron	3	10 G	W	88	95	38	90
tebuthiuron	12	10 G	W	100	100	100	100
tebuthiuron	3	bolus	W	68	90	90	96
tebuthiuron	12	bolus	W	48	80	57	90
bromacil	3	80 WP	W	25	25	100	50
bromacil	12	80 wp	W	85	92	100	100
bromacil	3	10 G	W	30	42	75	100
bromacil	12	10 G	W	90	95	100	100
glyphosate	3	3 lb/gal	W	61	87	100	52
glyphosate	12	3 lb/gal	W	96	100	95	12
control	-	-		5	7	0	0
2,4-D + diesel	1	4 lb/gal	S	15	10	0	0
2,4-D + diesel	4	4 lb/gal	S	30	22	43	0
2,4,5-T + diesel	1	4 lb/gal	S	25	17	0	0
2,4,5-T + diesel	4	4 lb/gal	S	50	37	13	0
silvex + diesel	1	4 lb/gal	S	13	5	0	0
silvex + diesel	4	4 lb/gal	S	25	22	0	0
2,4-D + 2,4,5-T + diesel	1 + 1	4 lb/gal	S	33	12	25	0
2,4-D + 2,4,5-T + diesel	2 + 2	4 lb/gal	S	45	17	27	0
2,4-D + oil*	1	4 lb/gal	S	45	25	18	0
2,4-D + oil*	4	4 lb/gal	S	55	47	13	0
2,4,5-T + oil*	1	4 lb/gal	S	40	37	13	0
2,4,5-T + oil*	4	4 lb/gal	S	45	7	13	0
silvex + oil*	1	4 lb/gal	S	20	17	0	0
silvex + oil*	4	4 lb/gal	S	47	15	37	0
glyphosate	1.5	3 lb/gal	S	88	97	30	0
glyphosate	12	3 lb/gal	S	90	100	50	35
control	-		S	0	5	13	0

*isoparaffinic oil

W = winter application (12/2/72)
S = spring application (5/10/73)

Evaluation of six foliage-applied herbicides for the control of Pacific poison oak. McHenry, W. B., E. J. Johnson, W. D. Hamilton and N. L. Smith. Six herbicides were tested at two locations to compare their effectiveness for the control of Pacific poison oak. Three replications were applied in San Mateo County, May 10, 1973, and a fourth replication in Alameda County May 31, 1973. Amitrole, silvex (isooctyl ester), and 2,4-D (butoxyethanol ester) + dichlorprop (butoxyethanol ester) were applied in 200 gpa water. Diesel oil at 1/2% by volume was included in all silvex and 2,4-D + dichlorprop applications. Asulam and glyphosate were applied in 40 gpa. Plot size was 240 sq. ft. All herbicides were applied when poison oak was in full bloom using a knapsack sprayer and single nozzle wand. Treatments were evaluated visually for control on May 14 and June 18, 1974.

Best control in June, 1974, was obtained from silvex at 4 and 8 lb ai/A or glyphosate at 5.3 and 10.6 lb/A. (Cooperative Extension, Univ. of California, Davis, Alameda Co., San Mateo Co., and Davis, respectively.)

Response of Pacific poison oak to six herbicides

		Control (10 = 100%)			
		San Mateo		Alameda	average
Herbicide	lb ai/A	5/14/74	6/18/74	5/14/74	5/14/74
amitrole	4	7.3	2.7	9.0	7.8
amitrole	8	9.0	6.6	9.9	9.2
amitrole	12	7.5	3.7	9.9	8.1
silvex + diesel	4	9.6	8.2	6.0	8.7
silvex + diesel	8	9.7	9.2	9.5	9.6
2,4-D + dichlorprop + diesel	4	9.3	4.0	9.9	9.5
2,4-D + dichlorprop + diesel	8	9.5	5.0	3.0	7.9
asulam	4	3.2	1.0	5.0	3.6
asulam	8	5.0	5.0	8.0	5.8
asulam	12	5.0	2.7	9.9	6.2
glyphosate	2.7	7.6	3.0	9.9	8.2
glyphosate	5.3	9.0	7.7	9.9	9.2
glyphosate	10.6	9.9	9.3	9.9	9.9
control	-	0	0	0	0

Karbutilate residues in stream water following a brush control treatment on a chaparral watershed in Arizona. Davis, Edwin A. Residue studies with brush control chemicals is an important part of our program to find an effective and environmentally safe chemical to control chaparral on watersheds. Because spot treatments and broadcast applications of soil-applied karbutilate showed considerable promise for controlling chaparral, residue studies were initiated.

This study was conducted to determine the extent and duration of residues of karbutylate and its metabolites in stream water following an aerial broadcast application. Karbutilate granules (10% active) were applied on February 18 at the rate of 20 lb ai/A on a 68-acre chaparral watershed (3-Bar F). The soil is a gravelly loam sand derived from granitic parent material. Since considerably lower application rates would normally be used, the results of this severe treatment provide data on the probable upper limits of karbutilate contamination of stream water that would result from treating comparable watersheds.

Water samples were collected from streamflow through a V-notch weir at the gaging station and were frozen until analyzed. The samples were analyzed with a DuPont Model 520 liquid chromatograph with a UV detector. The analytical method detects karbutilate and its decomposition products monomethyl-karbutilate and karbutilate phenol.

During the first year weekly water samples were analyzed. More frequent samples were analyzed shortly after treatment and during periods of heavy rainfall. Karbutilate was detected in concentrations of 0.01 - 0.02 ppm during and immediately after the application. This was probably due to karbutilate granules falling on stream water in the main channel near the weir. Except for a small surface stream near the weir the channels of the watershed were dry. During the first year the concentration of karbutilate never exceeded 0.051 ppm. Two minor concentration peaks occurred. The first peak (0.036 ppm) came the day after treatment following 1.30 inches of post-treatment rain. The second peak (0.051 ppm) came 44 days after treatment following 4.29 inches of cumulative rainfall. Thereafter, during the first year, only one sample exceeded the nondetectable level. A concentration of 0.014 ppm occurred in November following a series of rainstorms that produced 3.43 inches in nine days.

Monomethyl karbutilate was not detected in any of the samples, whereas karbutilate phenol was present in concentrations ranging from 0.02 - 0.21 ppm during the first 100 days. Thereafter it was not detected. Neither karbutilate nor its decomposition products were detected in samples taken about a half mile downstream in the main creek into which the stream from the treated watershed flows.

During the second year, and following years, only samples which were associated with periods of substantial rainfall were analyzed. The highest concentration (0.026 ppm) occurred following 3.61 inches of rain during the first three days of March. A 40-year storm event in September that produced 7.44 inches of rain in 24 hours yielded only 0.01 ppm karbutilate in stream water two days later and was not detected after four days. All subsequent samples during the second year yielded nondetectable concentrations. Rainfall during the second year totaled 27.07 inches.

During the third year the only sample that contained a detectable concentration (0.013 ppm) was taken at peak streamflow during a 2.23-inch September storm. All subsequent samples during the third, fourth, and fifth years gave negative results.

In view of the low levels of karbutilate residues in stream water that resulted from the 20 lb/A treatment and the low toxicity rating of karbutilate, there is reasonable hope that karbutilate will be an environmentally safe chemical for controlling chaparral on watershed lands. (Forest Service, USDA, Forest Hydrology Lab., Ariz. State Univ., Tempe, Arizona.)

PROJECT 4. WEEDS IN HORTICULTURAL CROPS

Harold M. Kempen, Project Chairman

SUMMARY

A total of 17 reports were submitted from California, Wyoming, Oregon, Utah and Arizona. These reports included results from trials on fruits and nuts, grapes, Christmas trees, turf and vegetables.

Fruits and nuts

Elmore, et al, were unable to kill 6 to 8 inch bermudagrass in walnuts with glyphosate applications of 1 to 8 lb/A applied in the early summer and retreated October 31.

Lange, et al, conducted tolerance trials with new herbicides on grape cuttings and rootings, apple plantings and fruit and nut plantings where soils were low in organic matter and clay content. Irrigation was by sprinklers followed by basin irrigation. Under such conditions, safe herbicides on grapes included oryzalin, USB-3153 and simazine plus napropamide. Six herbicides showed activity on yellow nutsedge. On apples oryzalin, USB 3153, RH 2915, oxadiazon, FMC-23486 and RP 20810 showed safety. FMC 25213 controlled rhizome bermudagrass. On 8 deciduous tree species, safe herbicides were oryzalin, RH-2915, USB 3153, RP 20810, RP 15018, oxadiazon, norflurazon, 2,4-D, glyphosate and FMC 25213.

On pecans, Hamilton found a combination of soil-incorporated diuron plus trifluralin effective and safe, whereas simazine was not. Other herbicide programs did not provide full-season control.

Vegetables

Heathman and Pew found pronamide most effective on September lettuce plantings at Yuma for control of wheat and Wright groundcherry. Control and yield was greater from preplant incorporated than from preemergence application of pronamide.

Anderson and Weeks found dinitramine to be the most effective herbicide against black nightshade where incorporated preplant with a rotary hoe on transplant tomatoes. Ashton, et al, showed that CDEC was effective against field dodder in tomatoes. Lange studied several chemical techniques to control broomrape in tomatoes.

On irish potatoes, Kempen indicates alachlor shows promise for yellow nutsedge control. Potatoes under sprinklers on low organic soils were tolerant to alachlor and six other nutsedge control herbicides. Collins in Oregon studied control of potato vines before harvest, obtaining effective results with several herbicides on Norgold cultivars. However, yield depression was indicated on Russets with certain herbicides. Three post-emergence studies on onions by Kempen at Bakersfield, California were conducted. Yellow nutsedge control was obtained with MSMA or

S-21634, with application to large nutsedge most effective. Results of applying herbicides to a wet vs dry soil surface indicated chloruxuron and methazole were safer on wetted soil. Oxadiazon appeared more effective on wetted soil. A comparison of several adjuvants with chloruxuron indicated that most wetting agents caused visible injury and yield depression of 10 to 15%. Colloidal's Tronic(R) adjuvant seemed the most logical one to use with chloruxuron.

Ornamentals

Alley and Lee found DCPA most effective against sandbur in bluegrass turf. Sandbur control in 3-year-old scotch pine Christmas trees was safely obtained with several triazine herbicides.

Elmore, et al, studied conversion of 2 to 6 inch bermudagrass turf to perennial ryegrass using glyphosate. September or October treatments up to 6 lb/A followed by verticutting and seeding to ryegrass gave up to 55% bermudagrass free ryegrass turf a year later without injury to the ryegrass.

Control of bermudagrass in established almonds and walnuts. Elmore, C. L., D. M. Holmberg, E. J. Roncoroni and C. L. Langston. Three trials were established to determine bermudagrass control in established almonds and walnuts using glyphosate and dalapon.

One trial was established June 22, 1973 and the other two trials were treated July 12, 1973. All plots except controls were retreated October 31, 1973.

Treatments were applied in 40 gpa water with a CO_2 pressure sprayer on 8 ft by 25 ft single tree plots. Each experiment was replicated four times. The bermudagrass was 6 to 8 inches in height and in vigorous growing condition when first treated. Experiments were visually evaluated on 8/9/73, 10/31/73, 6/5/74 and 11/1/74.

Glyphosate at the 1 lb and 2 lb rates provided poor bermudagrass control even with two applications per season.

Glyphosate at 4 lb/A gave 77% bermudagrass control after 4 months (table). At 8 lb/A, 85% control was achieved. Retreatment in the fall did not completely control bermudagrass at any location.

Two treatments of dalapon (4 lbs/A) gave approximately 20% control.

No phytotoxicity to almonds or walnuts was observed from treatment. (Cooperative Extension, University of California, Davis and Yolo County.)

Bermudagrass control evaluations in almonds and walnuts - average ratings 3 trials, 4 reps

Herbicide	lb ai/A	Average bermudagrass control[1/] 8/9/73	10/31/73	6/5/74	11/1/74
glyphosate[2/]	1	5.8	4.0	7.8	5.0
glyphosate[3/]	2	5.1	5.4	6.0	4.6
glyphosate	4	8.3	7.7	9.2	7.5
glyphosate	8	9.6	8.5	9.5	7.3
dalapon[2/]	4	2.8	1.3	2.5	0.5
control	-	0.0	1.3	0.0	0.0

[1/]Weed control 0 = no control; 10 = complete control.

[2/]Average of one trial, 4 replications.

[3/]Average of 3 trials, 4 replications.

Screening herbicides for weed control in young grape vines. Lange, A. H., B. B. Fischer, and J. Schlesselman. Twelve preemergence and two postemergence herbicides were compared with simazine for annual weed control and safety to young grape cuttings and rootings. One postemergence herbicide was compared with 2,4-D for safety to grape cuttings. The cuttings were planted in a Hanford sandy loam (OM 0.6%, sand 58%, silt 72%, clay 10%) on 2/7/74 and irrigated on 2/8/74 and 2/12/74. About one month later on 3/7/74, the preemergence herbicides were applied to moist soil tilled prior to application because of excessive weed growth. The post plant herbicides were applied on 4/17/74 in a directed spray to the base of the cutting as put forth in the table. Some grape foliage was inadvertantly sprayed during the application. One chemical, SN-49962 was applied preemergence to the dormant cuttings on 3/7/74 and to leafed out grape plots and incorporated with a small power tiller on 4/17/74. Likewise, oxadiazon and glyphosate were applied 3/7/74 to dormant cuttings and again to other plots after they had leafed out 4/17/74. In one set of plots, the vines were shielded with cardboard during glyphosate application so that only the soil surface was sprayed.

Herbicides giving good grass control with adequate safety were simazine plus napropamide, oryzalin and USB-3153. Oryzalin showed early stunting to both rootings and cuttings at 16 lb/A but recovered by September. Those herbicides showing excessive injury to grapes included VCS-3438, MBR-11464, FMC-23486, DPX 3674, and the postemergence herbicides directed at the base of young growing vines applied at the high rates. At the low rates, the effects were considerably less. An apparent effect of low rates on dormant rootings could not be explained since the high rate showed little or no effect. The later poor growth in the glyphosate plots was probably due to the lack of weed control as seen when compared to the grape vigor in the weedy check and the low rates of the less effective herbicides. Some of the loss of vigor (ratings), i.e., less than simazine plus napropamide were due to a heavy stand of yellow nutsedge in some of the plots with good annual weed control, i.e., oryzalin and USB-3153. Although the grass control by September in the FMC-25213 plots was poor, the nutsedge control was good resulting in fairly vigorous vines. Other herbicides showing activity on nutsedge were VCS-3438, MBR-11464, RP-15018, SN-49962, DPX 3674, and VCS-5026. Of these, only SN-49962, RP-15018, and FMC-25213 showed any safety on grapes. (San Joaquin Valley Agricultural Research and Extension Center, University of California, Parlier, California.)

A comparison of new herbicides for weed control and phytotoxicity to newly planted grape rootings and unrooted cuttings

Herbicide	lb/A	Date[5/] sprayed	Grass[2/] control	Nutsedge[3/] control[1/]	Phytotoxicity[1/] Grape Rooting	Phytotoxicity[1/] Grape Cutting	Grape[a/] vigor
simazine (80 W)	2	3/7	5.3	3.0	1.0	3.3	6.6
simazine (4 F)	2		3.0	3.0	1.3	0.6	5.0
simazine + napropamide	1/2+4	3/7	9.0	1.0	2.0	4.0	7.6
oryzalin	4	3/7	9.6	0.0	0.3	0.6	5.6
oryzalin	16		10.0	2.0	5.3	5.3	6.3
oxadiazon (3 F)	4	4/17	1.0	0.0	0.6	7.6	4.6
oxadiazon (2 EC)	4		1.3	0.3	1.0	3.3	3.6
oxadiazon	4	3/7	3.3	0.0	1.3	3.0	3.6
oxadiazon	16		7.6	3.3	1.0	1.3	6.3
RP-15018	4	3/7	0.0	3.3	1.3	1.6	1.3
RP-15018	16		0.6	7.3	2.3	3.0	4.3
RH-2915	2	3/7	7.6	3.3	3.0	4.0	5.6
RH-2915	8		4.0	3.3	4.3	3.3	6.6
USB-3153	4	3/7	9.3	3.3	0.6	2.0	5.0
USB-3153	16		9.6	4.3	0.6	2.3	7.6
FMC-25213	4	3/7	1.6	9.3	0.3	3.3	7.0
FMC-25213	16		4.0	10.0	2.3	4.0	7.0
FMC-23486	2	3/7	1.6	7.0	1.6	2.0	5.0
FMC-23486	8		3.0	6.6	9.3	6.0	0.0
MBR-11464	2	4/17	0.0	2.0	2.6	2.6	3.3
MBR-11464	8		2.6	8.0	7.0	7.6	2.6
MBR-12325	1/2	4/17	0.6	2.3	1.3	2.3	2.6
MBR-12325	2		0.0	0.0	0.3	2.6	4.0
SN-49962(No Incorp)	2	3/7	1.0	6.6	1.6	2.6	3.6
SN-49962(Incorp)	2	4/17	0.0	8.6	3.3	4.0	2.6
SN-49962(Incorp)	8		4.0	9.6	2.6	3.3	8.0
VCS-3438	2	3/7	0.0	6.0	7.6	5.0	0.0
VCS-3438	8		1.0	10.0	9.0	8.6	0.3
VCS-5026	1/2	4/17	0.6	0.0	0.6	3.3	6.6
VCS-5026	2		1.6	8.0	5.3	5.6	4.3
DPX-3674	2	4/17	3.0	6.6	4.3	5.6	3.6
DPX-3674	8		8.3	10.0	8.6	5.3	1.0
2,4-D (OSA)	2	4/17	0.0	2.6	3.0	6.6	0.3
2,4-D	8		0.3	4.6	6.0	9.0	2.0
glyphosate	3	4/17	0.0	6.3	2.6	3.6	2.0
glyphosate	12		0.0	5.3	6.0	4.3	3.6
glyphosate[4/]	12	4/17	2.0	7.6	3.0	3.0	4.3
check	0		0.0	2.6	2.0	6.6	1.6

[1/] Average of 3 reps. where 0 = no effect, 10 = complete kill. Evaluated 5/20/74, and (a) 9/12/74.

[2/] Cupgrass Eriochloa gracilis

[3/] Nutsedge (Cyperus esculentus L.)

[4/] Shielded application to soil only.

[5/] All plants treated 4/17 were leafed out; on 3/7, were dormant.

Herbicide screening trials for young golden delicious apple trees. Lange, A. H., J. Schlesselman, and L. Nygren. Fourteen herbicides were compared with simazine for weed control and phytotoxicity to newly planted golden delicious on Malling 7 rootstock growing in a Delhi sandy loam (OM 0.1%, sand 72%, silt 22%, clay 6%). The applications were made 3/7/74 to the newly prepared soil and the bottom 4 inches of dormant trees planted 2/15/74. The plots were sprinkler irrigated with about 1 inch of water 3/8/74. The later application was made 4/17/74 to the young trees which had leafed out and was likewise irrigated on 4/20/74.

Those herbicides showing adequate annual grass control at the low rate and sufficient safety to young apples included oryzalin and USB-3153. Those additional compounds showing grass control at the high rate and no injury to apples included RH-2915, oxadiazon, FMC-23486, and RP-20810.

Those herbicides excessively toxic to apples included VCS-3438 and FMC-23486.

FMC 25213 gave excellent preemergence control of rhizome bermudagrass. This grass was well broken up from tillage but prevalent and growing vigorously in the test area. This herbicide gave poor control of large crabgrass but early annual weed control in another trial. These results suggest that FMC 25213 is a mobile herbicide with somewhat short persistence in soil.

Norflurazon, very effective on grasses in other trials, may have had insufficient water incorporation before leaving the soil surface in this late (4/17/74) application. However, 7 months after application, it is still killing barley in this trial. (San Joaquin Valley Agricultural Research and Extension Center, University of California, Parlier, California.)

The effect of 15 herbicides on the control of large crabgrass, bermudagrass and phytotoxicity to newly planted golden delicious apple trees

Herbicide	Date sprayed	lb/A	Crabgrass control	Average[1/] Bermudagrass control	Phyto-toxicity
simazine	3/7	2	7.0	5.0	0.0
oryzalin		4	9.5	6.0	0.0
oryzalin	3/7	16	10.0	3.0	0.0
VCS 3438	3/7	2	2.0	4.0	9.0
VCS 3438		8	3.0	7.5	10.0
RH 2915	3/7	2	2.0	1.0	0.0
RH 2915		8	8.0	4.0	0.0
oxadiazon	3/7	4	6.5	0.5	0.0
oxadiazon		16	10.0	3.5	0.0
USB 3153	3/7	4	10.0	3.0	0.0
USB 3153		16	10.0	1.0	0.0
FMC 23486	3/7	2	6.0	5.5	10.0
FMC 23486		8	10.0	10.0	10.0
FMC 25213	3/7	4	2.5	8.0	0.0
FMC 25213		16	3.5	7.5	0.0
MBR 11464	4/17	2	1.0	0.0	1.0
MBR 11464		8	5.0	2.5	3.0
RP 20810	3/7	3	5.5	7.0	0.0
RP 20810		12	9.0	2.5	0.0
RP 15018	3/7	4	4.5	2.0	0.0
RP 15018		16	3.5	6.5	0.5
pronamide	4/17	4	3.5	0.0	1.5
pronamide + RH 2915	4/17	4+2	6.0	0.0	0.0
SN 49962	4/17	2	4.5	0.0	2.5
SN 49962		8	6.5	4.0	1.5
MBR 12325	4/17	1/2	0.0	0.0	2.0
MBR 12325		2	1.0	0.0	5.0
norflurazon	4/17	2	6.5	3.0	0.0
norflurazon		8	5.0	4.0	0.0
check		0	1.5	0.0	1.5

[1/] Average of two replications where 0 = no effect, 10 = complete kill. Weed control evaluated 5/30/74; phytotoxicity 7/29/74.

Herbicide screening trials for deciduous fruit and nut trees. Lange, A. H., B. B. Fischer, and J. Schlesselman. Nineteen herbicides were compared with simazine for annual control and phytotoxicity to nine deciduous fruit tree varieties. Herbicides were applied 3/7 to freshly prepared soil four weeks after planting new trees from the nursery. The soil was a Hanford sandy loam (OM 0.3%, sand 53%, silt 35%, and clay 12%). On April 17th, those plots not treated earlier on 3/7/74 were sprayed as indicated in the table. After the preemergence application, one inch of sprinkler irrigation was applied. The 4/17 herbicide applications were sprinkled seven days after application in order to evaluate the foliar activity of some of the postemergence herbicides. The sprinklers were then removed from the field and each of the 10 ft x 20 ft plots were individually basin irrigated for the remainder of the season. The plots were evaluated on 5/30 and 7/29/74 for weed control and general phytotoxicity.

The standard for comparison was simazine at 2 lb applied as a wettable powder and a flowable concentrate. Oryzalin showed no injury and excellent control of grasses. Several other new herbicides were safe on trees. RH-2915 showed excellent safety on all varieties and good broadleaf winter weed control. Later in the season, grasses grew particularly in the low rate. RP-20810 and RP-15018 showed considerable selectivity for tree fruits. Oxadiazon was safe but somewhat weak on grass species later in the summer. SN-45311 and SN-49962 showed some slight to intermediate phytotoxicity to most tree species. Annual grass control was poor.

One of the outstanding chemicals in the last 3 years testing was USB-3153. There was no apparent phytotoxicity from this herbicide and even the low rates gave excellent grass control, along with some winter broadleaf weed control.

FMC 25213 and FMC 23486 were quite different in their effect on trees, the latter being considerably more toxic than the former. FMC-25213 showed less residual annual grass control but showed some possibilities on bermudagrass.

The oil soluble amine formulation of 2,4-D showed virtually no injury through the soil or from basal application at the rates used in this test.

MBR-12325 showed very little effect on trees or preemergence effect on weeds. It did cause some stunting of the emerged weeds.

On the other hand, another translocated herbicide, glyphosate, was fairly safe when applied under the conditions of this experiment. It showed no effect when applied to the soil and virtually none when applied to the trunk and the soil surface at rates up to 8 lb/A. DPX 3674, a new soil applied herbicide, is also believed to be a translocated herbicide and was very toxic to all species, as was VCS-5026, another persistent herbicide with considerable activity on most weed species.

Norflurazon, in previous tests shown to be safe on planted trees, was quite safe at even the high rate, with possible exception of French prune. The cupgrass control was excellent. (San Joaquin Valley Agricultural Research and Extension Center, University of California, Parlier, California.)

A comparison of phytotoxicity of 18 herbicides and simazine on 9 newly planted tree fruit species and a natural stand of broadleaf and grassy weeds

			Phytotoxicity[1]				Weed control[1]	
Herbicide	lb/A	Date applied	Bartlett pear	Mis'n almond	Stone fruit[4]	Black walnut	B'dleaf weeds	Grass
simazine (80 W)	2	3/7	2.6	2.3	1.5	0.0	10.0	7.0
simazine (4 F)	2	3/7	0.7	2.7	1.9	1.0	10.0	3.7
oryzalin	4	3/7	1.3	0.0	0.2	1.0	9.6	8.3
oryzalin	16		0.0	0.0	0.0	0.0	10.0	10.0
VCS-3438	2	3/7	2.0	8.3	7.7	2.7	10.0	6.3
VCS-3438	8		7.3	10.0	9.4	8.0	10.0	9.0
RH-2915	2	3/7	1.7	0.0	0.3	0.7	10.0	5.3
RH-2915	8		0.0	0.0	0.0	0.0	10.0	7.7
MBR-11464	2	4/17	3.3	4.3	4.4	1.7	4.3	4.3
MBR-11464	8		4.3	6.0	7.0	6.0	5.6	4.0
RP-20810	3	3/7	1.0	0.7	0.1	2.3	10.0	4.7
RP-20810	12		0.7	0.0	0.3	1.7	10.0	7.3
RP-15018	4	3/7	1.0	0.0	0.2	0.6	8.6	2.3
RP-15018	16		0.7	0.0	0.1	0.0	9.0	3.7
oxadiazon	4	3/7	0.0	0.0	0.2	0.0	9.3	3.3
oxadiazon	16		0.0	0.0	0.1	0.7	10.0	8.3
SN-45311	2	3/7	3.7	0.3	1.0	0.0	10.0	2.3
SN-45311	8		3.7	2.0	2.2	0.7	10.0	5.7
SN-49962[2]	2	4/17	0.7	0.0	1.5	1.3	9.6	2.3
SN-49962[2]	8		3.0	1.3	1.0	0.0	10.0	4.7
USB-3153	4	3/7	0.3	0.0	0.3	0.0	6.3	8.7
USB-3153	16		1.7	0.0	0.1	0.0	8.0	9.0
FMC-25213	4	3/7	1.7	1.6	0.6	0.0	5.0	2.0
FMC-25213	16		1.3	0.0	0.1	0.0	10.0	5.0
FMC-23486	2	3/7	3.7	8.3	3.6	1.3	10.0	7.3
FMC-23486	8		7.3	9.3	8.6	7.7	10.0	9.3
2,4-D (OSA)	2	4/17	1.0	0.6	0.8	1.0	7.6	2.3
2,4-D (OSA)	8		0.7	1.0	0.9	2.7	9.3	5.0
MBR-12325	1/2	4/17	2.3	4.0	3.8	2.3	1.6	0.6
MBR-12325	2		1.6	3.0	3.4	4.3	2.3	3.0
glyphosate	2	4/17	0.3	0.0	0.3	0.0	10.0	1.3
glyphosate	8		0.6	0.0	1.0	0.6	10.0	1.6
glyphosate(Soil[3])	8		0.3	0.3	0.2	0.0	9.0	1.0
DPX 3674	2	4/17	9.3	10.0	9.4	7.0	9.6	9.3
DPX 3674	8		10.0	10.0	10.0	9.3	10.0	10.0
VCS-5026	1/2	4/17	2.3	4.3	3.2	3.6	9.3	5.0
VCS-5026	2		4.0	8.0	8.5	5.0	10.0	8.6
norflurazon	2	4/17	0.0	1.7	0.8	1.0	4.0	10.0
norflurazon	8		3.0	1.3	2.3	2.3	6.6	9.3
check	0		1.0	2.3	1.6	1.3	5.6	2.0

[1] Average of 3 reps., 1 tree of each per plot; rated 7/29/74 where 0 = no effect, 10 = complete kill.

[2] Applied with paraquat at 1 lb/A to pineapple weed, fiddleneck, red maids, cupgrass, and crabgrass.

[3] Soil only, trunk shielded.

[4] Average phytotoxicity rating of Fay Elberta peach, Perfection and Tilton apricots, Santa Rosa plum, French prune and Bing cherry.

Herbicide combinations in pecans. Hamilton, K. C. For the past 4 years, herbicide combinations have been applied in Western Schley pecans at Red Rock, Arizona, to determine the effects on summer 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 diuron and paraquat were applied broadcast to weed foliage and soil. Each plot contained three trees planted 30 feet apart and herbicides were applied in a 15 ft band centered on the tree row. Treatments were replicated three times. Weeds on the area included tumble pigweed, junglerice, barnyardgrass, 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, except that the summer applications of paraquat and diuron were not needed or applied in 1973 and 1974. The test area was not cultivated but was disked in the spring and fall.

Seven herbicide programs gave 96% weed control or better for the 4 years (see table). The most satisfactory programs contained diuron and trifluralin. These three programs gave 98 to 100% weed control and produced little (less than 1%) chlorosis of pecan foliage. Programs containing 1 lb/A of simazine caused 1 to 5% chlorosis of pecan foliage in June. The program containing 2 lb/A of simazine caused chlorosis of 8, 19, 17, and 47% of pecan leaves in the 4 years. Simazine-induced chlorosis occurred 3-4 weeks earlier than diuron-induced chlorosis.

All herbicide combinations controlled annual weeds from April to July. Herbicide programs and combinations which failed to provide full-season weed control in these tests were simazine - DCPA, simazine - bensulide, simazine - profluralin, simazine - dinitramine, simazine - nitralin, DCPA - DCPA, diuron - diuron, diuron - nitralin, diuron - profluralin, and diuron - dinitramine. (Ariz. Agr. Exp. Sta., Tucson.)

Control of summer annual weeds with herbicide combinations in pecans at Red Rock, Arizona in 1971 to 1974

Treatment		Weed control percent estimated in October			
Date	Herbicide - lb/A	1971	1972	1973	1974
Fall	diuron - 1 Spring trifluralin - 2	99	100	100	100
Fall	simazine - 1 Spring trifluralin - 2	99	100	98	99
Fall	simazine - 1 Spring trifluralin - 2 and simazine - 1	98	98	100	100
Spring	diuron - 1 and trifluralin - 2	99	98	100	100
Spring	simazine - 1 and trifluralin - 2	97	100	100	100
Spring	trifluralin - 2 Summer paraquat - 5%	96	100	99	99
Spring	trifluralin - 2 Summer diuron - .5	98	100	100	98

Evaluation of weed control in lettuce. Heathman, E. S. and W. D. Pew. This test was established September 17, 1973, at the Yuma Valley Experiment Station for fall planted lettuce. Herbicides were applied with a two nozzle boom, in 29 gpa of water, in a 27-inch band over the beds with a compressed air sprayer. Herbicides tested were pronamide, benefin, and VCS 3438. There were two methods of application: PI (Preplant Incorporated) herbicides applied over shaped beds and power incorporated 1 to 2 inches before planting. PE (Preemergence) herbicides applied over bed after planting and before the germination irrigation. Plot size was 4 beds wide, 30 feet long, and replicated 5 times. Lettuce was planted 2 rows on 40 inch beds and furrow irrigated. Soil type was a medium clay loam.

Weed counts were made October 9, before thinning and weeding. Weeds were counted on the bed top of a center bed for a distance of 10 feet in each plot. Stand counts were made after thinning on 26 feet of a center bed. There was no difference in lettuce stands due to treatment.

Harvest data was determined December 19, 1973, from a 26-foot section of a center bed at about the same location in each plot. An estimate was then made of the potential for second harvest on the same area of the harvested bed.

Benefin plus pronamide PI controlled wheat and Wright groundcherry. Pronamide PI controlled wheat and Wright groundcherry less effectively. All other treatments did not control wheat and were not effective for control of Wright groundcherry. VCS 3438 was more active in the control of Wright groundcherry than wheat. Power incorporation increased weed control with pronamide and VCS 3438.

Yields of lettuce at first harvest and average head weight were highest with pronamide PI. First harvest yields were less where pronamide plus benefin PI were applied than for pronamide PI alone, but were better than the other treatments. The 2 lb/A rate of VCS 3438 decreased yields of lettuce below the 1 lb/A rate.

Yields of lettuce at first harvest were greater than the check with all herbicide treatments although weeds were only partially controlled in some herbicide treatments.

While weed control was most effective with application of pronamide plus benefin PI, first harvest yields were significantly greater with pronamide PI alone. The combination treatment of pronamide plus benefin PI had an adverse effect on lettuce growth and maturity. (Arizona Cooperative Extension Service, University of Arizona, Tucson, Arizona.)

Table 1. Effect of herbicides on control of wheat and Wright groundcherry before thinning lettuce

Treatment: Herbicide	(lb/A)	Method of application	Weed control estimated: Wheat (%)	Weed control estimated: Wright groundcherry (%)
pronamide	1	PI	82 a[1/]	86 ab
pronamide	1	PE	27 b	42 de
benefin	1	PI	25 b	52 cde
benefin + pronamide	1 1	PI	97 a	95 a
VCS 3438	1	PI	27 b	66 bcd
VCS 3438	2	PI	25 b	75 ab
VCS 3438	1	PE	21 b	33 e
VCS 3438	2	PE	0 b	72 bc
check			0 b	0 f

[1/]Means followed with the same letter are not significantly different at the .05 level.

Table 2. Effect of herbicides on percent of lettuce that was of marketable size, average weight of marketable heads, and percent of total population not likely to be marketable at second harvest time

Treatment: Herbicide	(lb/A)	Method of application	Percent of marketable size	Average weight (lb)	Percent not harvestable 2nd harvest
pronamide	1	PI	78 a[1/]	1.80 a	11 a
pronamide	1	PE	62 c	1.60 bc	19 abc
benefin	1	PI	59 cd	1.65 b	22 abc
benefin + pronamide	1 1	PI	71 b	1.77 a	18 ab
VCS 3438	1	PI	61 cd	1.64 b	24 abc
VCS 3438	2	PI	55 d	1.74 a	32 bcd
VCS 3438	1	PE	56 d	1.61 bc	26 abc
VCS 3438	2	PE	48 e	1.55 c	42 d
check			39 f	1.54 c	35 cd

[1/]Means followed with the same letter are not significantly different at the .05 level.

Effectiveness of dinitramine for weed control in transplanted tomatoes. J. LaMar Anderson and Mervin G. Weeks. Our previous work had indicated that dinitramine was highly toxic to direct seeded tomatoes whereas transplanted tomatoes showed considerable tolerance. Dinitramine was also highly effective in removing black nightshade from treated tomato plots. To further test its effectiveness in transplanted tomatoes, dinitramine was incorporated 2 inches deep with a rotary hoe at rates of 1/4, 3/8, and 1/2 lb/A in a sandy loam having 1% organic matter. Trifluralin, isopropalin and a commercial preparation of trifluralin plus diphenamid were also incorporated for comparison May 2, 1974. Tomatoes were transplanted into the plots May 9, 1974. The plots were heavily overseeded with a mixture of weed seed screenings, primarily redroot pigweed and barnyardgrass. The weed infestation was so heavy in the untreated plots that the transplanted tomatoes were nearly choked out. All dinitramine treatments gave good weed control. The dinitramine plus diphenamid treatment was particularly impressive and these plots outyielded all other treatments. The isopropalin and trifluralin plus diphenamid treatments failed to give seasonal control of high weed population; considerable redroot pigweed developed late in the season and reduced yields in these plots. This is the first year that the trifluralin plus diphenamid plots have not been the highest yielding tomato plots at the Farmington field station. Dinitramine appears promising for weed control in transplanted tomatoes; it controlled black nightshade better than other chemicals tested and merits further evaluation. (Utah Agricultural Expt. Sta., Utah State Univ., Logan, Utah.)

Effects of preplant incorporated herbicides on weed control and yield of transplanted tomatoes

Treatment	Rate (lb/A)	Weed[1/] control	Weeds[2/] remaining	Tomato[1/] vigor	Tomato[3/] yield
dinitramine	1/4	8.0	1	9.5	292.5
dinitramine	3/8	9.4	1	8.8	264
dinitramine	1/2	9.5	1	9.2	288.5
dinitramine	1/4				
plus diphenamid	3	9.6	1	10	379
trifluralin	1/4	6.9	1,2	9.0	286.5
trifluralin	1/4				
plus diphenamid	4	7.3	3,4	10	226
isopropalin	1	6.1	1,2,3,4	9.8	235
unweeded control		0	1,2,3,4	1	10

[1/] Control 0 = no effect, CO = complete kill; vigor 0 = dead, 10 = normal vigor; 7-16-74.

[2/] 1 = Capsella bursa-pastoris (L.) Medic, 2 = Solanum nigrum L. 3 = Amaranthus retro flexus L., 4 = Echinocloa crusgalli (L.) Beauv.

[3/] Total yield (lbs) of 3 hand harvests of 4 replications 8-28, 9-6, 9-26-74.

Control of field dodder in tomatoes. Ashton, F. M., R. K. Glenn, L. L. Buschmann, R. S. Baskett, and W. S. Seyman. Six field experiments were conducted to evaluate the use of CDEC as a preemergence or preplant soil incorporation treatment for the control of field dodder in tomatoes. CDEC gave 90, 92, 94, 95, 100, and 100% control of field dodder in these six experiments. Experiments conducted in 1972 and 1973 gave similar results. In this years research, CDEC did not cause any injury to tomatoes at 6 lb/A; however, a slight suppression of growth early in the season has occasionally been observed in the past. This growth suppression is not usually observable after the first few weeks. Based on these three years of field experiments we are prepared to recommend CDEC at 6 lb/A as a preemergence (with sprinkle irrigation) or a preplant soil incorporation treatment for the control of field dodder in direct seeded tomatoes. (Department of Botany, Univ. of California, Davis.)

A summary of two years research on hemp broomrape control in tomatoes. Lange, A., L. Nygren and J. Schlesselman. Hemp broomrape, a parasitic plant of many crops of the middle east, is a potential threat to California agriculture. The present infestation in California has been largely confined to tomato crops in the southern San Francisco bay area with only an occasional outbreak in other counties. Since the tomato has been its major host, this crop is quarantined in the area (plant material cannot be moved out). There is also a grower and state supported program to eradicate all new outbreaks by means of methyl bromide fumigation. In the event of a widespread outbreak, it would be necessary to control broomrape by less expensive means.

The work, thus far, has shown several possible approaches. One of these is layering herbicides with a spray blade. High rates of trifluralin looked commercially feasible in the heavy soil of the test area. High rates bladed were more effective than low rates, but even at the low rates, broomrape emergence was retarded.

One trifluralin related compound, CGA-14397, looked equally as good as trifluralin. This group of herbicides offer possible economic control, i.e., possible reduction of the broomrape but not eradication.

Trifluralin incorporation studies with a power tiller showed deep incorporation (6 inches) was better than shallow incorporation (3 inches). These results suggest that trifluralin when incorporated is affecting the germinating broomrape or interfering with the parasitizing mechanism in another way. Incorporation of trifluralin looked better in terms of numbers of attachments than the spray blade layering technique at the end of the season, which means that the layer of trifluralin did not have as much effect on the emerging shoot of broomrape as it appeared to have on, for example, the shoots of perennial bindweed as seen in earlier work.

The incorporation of napropamide also looked promising, particularly since this herbicide is safer on tomatoes than trifluralin. In the first incorporation test, metribuzin looked spectacularly good, whereas, in the later test, the same rates looked less striking. This may mean that the downward movement of metribuzin (a relatively soluble herbicide - 2000 ppm in water) may have been more effective during the longer period of irrigation, i.e., more of the metribuzin may have reached the strata in the soil profile where broomrape was germinating in the earlier work.

There appeared to be an effect of physiological age of the transplants on broomrape ability to parasitize the roots of tomato. That is, the younger the plants at the time of transplanting, the greater the infestation of broomrape.

Overall postemergence sprays of glyphosate and other foliar herbicides killed broomrape attached to tomato plants. One new translocated herbicide, MBR-12325, appeared to cause considerably more damage to the broomrape plant than to the tomato. These results suggest the possibility of a foliar applied "systemic" herbicide, which may open a whole new avenue of research with herbicides for selective broomrape control.

In the event of an outbreak of broomrape, such as in the San Joaquin Valley or other areas of the west, available chemicals exist that can be used to spot treat the tomato plant and the broomrape prior to flowering and seed production. The results of these studies suggested control measures could be developed to reduce the detrimental effect of broomrape on tomatoes.

Yellow nutsedge control in potatoes. Kempen, H. M. Six trials conducted on February or August plantings of White Rose potatoes to control yellow nutsedge indicate effective control can be obtained with alachlor at usage rates of 1 to 2 lb/A. Potato tolerance on sandy loam soils with organic matter contents from 0.1% to 0.5% has been excellent with one exception where 4 lb/A caused trends for reduced yield after early retardation of plants. Alachlor showed more effectiveness than EPTC on August plantings but was equal on spring plantings. Applications by air or through sprinklers would seem logical but have not been evaluated as yet.

Other herbicides showing effective nutsedge control and safety to potatoes in limited tests include U 27267, H 52234, H 25893, H 26910 and napropamide. (Cooperative Extension, Univ. of California, Bakersfield.) (San Joaquin Valley Agricultural Research and Extension Center, University of California, Parlier, California.)

Preharvest vine kill in potatoes. Collins, R. L. In the Oregon Willamette Valley, there has been a perennial problem of obtaining adequate vine kill prior to harvest. Many times, two vine killer applications were needed to kill down lush vegetative growth. Studies were conducted on two potato varieties to determine the effectiveness of potato vine killers in conjunction with the cultural practice of rolling the vines one week prior to application.

The equipment used to roll the potatoes is a steel drum 13 feet wide, on which old truck tires are mounted. This rubber-tired roller is attached to a wishbone shaped tongue and towed easily with a tractor at 4 to 6 mph through the field.

All plots were replicated four times in a randomized block design experiment. Visual ratings were taken twice of the vine kill down. Yield measurements were taken from each plot from 2 rows by 21 feet long. Stem end discoloration ratings were made by sampling 20 tubers from each replicate, and scoring on a 0-10 scale.

The Norgold potato experiment conducted at Scholls, Oregon, had a plot size of 4 rows by 21 feet. All treatments were applied in 20 gpa water except ametryne, which was 40 gpa. The Russet potato experiment conducted at Hillsboro, Oregon, had a plot size of 3 rows by 21 feet. All treatments were applied in 40 gpa water except ametryne, which was 80 gpa.

It appears that rolling prior to potato vine killing is helpful to obtain better kill down. Ametryne is more effective if high amounts of water are used. Stem end discoloration did not appear to be significantly different from the checks. In regard to yield effects, there did not appear to be any significant differences of rolled and unrolled vines in the Norgold potato trial. However, there may be some significant yield reductions with ametryne, dinoseb, and paraquat in the rolled Russet potatoes. In the unrolled Russet potato trial some reduction in yield appears likely with the dinoseb formulations. The results of the different vine killing treatments are found in Tables 1 and 2.
(Pest Management Consultant, Hillsboro, Oregon.)

Table 1. Summary of preharvest vine killing, Norgold potatoes, Scholls, Oregon

		Average kill down rating**				Average yield, lbs/plot			
	Rate	8-26-74		9-3-74		Rolled		Unrolled	
Treatment	(lb/A)	rolled	unrolled	rolled	unrolled	#2 or better	%SD*	#2 or better	%SD*
endothall	1.04	7.6	6.7	9.4	9.0	79.7	2.6	70.6	1.6
ametryne	3.0	5.5	3.7	8.3	7.7	82.0	1.5	75.2	1.9
paraquat	0.5	9.1	7.8	9.4	9.1	82.5	1.6	68.2	1.3
dinoseb	1.87	9.4	8.6	10.0	9.4	73.2	2.1	73.7	2.5
check	-	0.2	0.0	2.0	0.0	78.7	1.1	82.2	2.1

*% stem end discoloration
**0 = no effect, 10 = complete vine kill
planted 5-8-74, rolled 8-16-74, treated 8-22-74, harvested 9-7-74

Table 2. Summary of preharvest vine killing, Russet potatoes, Hillsboro, Oregon

		Average kill down rating**				Average yield, lbs/plot			
	Rate	10-5-74		10-15-74		Rolled		Unrolled	
Treatment	(lb/A)	rolled	unrolled	rolled	unrolled	#2 or better	%SD*	#2 or better	%SD*
ametryne 80 WP	3.0	7.2	4.8	9.3	9.2	70.7	1.6	90.5	2.0
dinoseb 1.87 lb/gal	1.87	8.5	7.0	10.0	9.6	69.6	1.7	69.6	3.8
dinoseb 2.50 lb/gal	1.87	8.3	6.6	10.0	8.3	70.0	3.1	82.0	3.6
paraquat CL	0.5	7.6	5.5	9.3	8.0	75.7	1.8	86.7	3.1
endothall 0.52 lb/gal	1.04	8.1	7.0	10.0	8.5	89.7	1.6	96.5	2.7
check	-	1.0	0.0	8.7	7.5	93.7	1.9	91.7	2.7

*% stem end discoloration
**0 = no effect, 10 = complete vine kill
planted 6-8-74, rolled 9-27-74, treated 10-1-74, frost 10-5-74, harvest 10-18-74

Candidate herbicides for nutsedge control in onions. Kempen, H. M. Bentazon, MSMA and S-21634 were applied at two yellow nutsedge growth stages in White Globe onions under sprinkler irrigation on sandy loam soil. Nutsedge was 3-8 inches on April 17, 1974 and 8-12 inches on April 31, 1974. Temperatures were near 70F on the first date and 85F on the second. Onions were at the 7th leaf stage on April 17. Sprays were applied topically in 35 gpa at the low rate or 70 gpa at the high rate. On the second date, a directed spray of MSMA was made to the furrow area only. Citowett(R) wetting agent at 1/2% v/v was added to one bentazon treatment.

Results showed that the later application was much more effective with all herbicides. All herbicides caused some injury but yields were equal or better than untreated check plots. The most promising treatment was the late directed MSMA spray. Probably bentazon or S-21634 could be used this way also. Such a technique could greatly reduce the buildup of yellow nutsedge which now occurs in sprinkler irrigated onions. (Cooperative Extension, Univ. of California, Bakersfield.)

Table 1. Candidate herbicides for nutsedge in onions[1/]

Herbicide	lb/A	Nutsedge control[2/] 5/24	5/30	7/19	Onion injury[2/] 5/24	5/30	Harvest sacks/A 7/30
S-21634	3	4.8	3.8	6.0	1.8	2.0	599.7
S-21634	6	7.5	6.5	8.5	2.5	3.8	472.1
Bentazon	3/4	2.0	1.5	2.5	0.5	1.0	530.6
Bentazon	1½	3.5	2.8	4.0	1.5	1.8	534.6
Bentazon + Citowett	3/4	2.8	3.5	2.5	1.0	3.0	548.6
Bentazon + Citowett	1½	4.5	4.8	4.5	2.5	4.3	543.6
MSMA	1½	2.8	3.3	3.8	0.3	0.5	570.6
MSMA	3	4.5	4.0	6.0	0.3	0.8	584.8
MSMA	6	6.0	5.3	7.0	2.8	3.8	536.3
MSMA	12	8.5	6.8	9.5	4.3	5.3	484.3
Nitrofen	3 + 3	3.8	2.5	4.5	0.0	0.0	483.5
Nitrofen	6 + 6	6.3	3.8	7.0	0.5	0.0	540.0
Untreated	-	0.0	0.0	0.0	0.8	0.5	427.1
Untreated	-	0.3	0.0	0.5	1.0	0.5	427.8
LSD .05		2.1	1.0	1.8	1.7	1.3	96.1
.01		2.9	1.3	2.4	2.2	1.7	128.3

1/ Applied April 17, 1974. Onions 7 leaf; yellow nutsedge 3-8 inches.

2/ Control or injury ratings: 0 = no effect; 10 = kill.

Table 2. Late application of herbicides for nutsedge control in onions[1/]

Herbicide	lb/A	Nutsedge control[2/] 5/27	Nutsedge control[2/] 7/19	Onion injury[2/] 5/27	Onion harvest sacks/A 7/30
Untreated	-	0.0	0.0	0.8	497.6
Untreated	-	0.0	0.0	0.8	530.3
S-21634	3	7.0	8.5	0.0	528.1
S-21634	6	8.3	9.5	0.8	531.4
Bentazon	3/4	3.5	2.5	1.5	530.3
Bentazon	1½	4.5	3.0	2.3	519.9
Bentazon + Citowett	3/4	3.8	3.0	2.0	550.5
Bentazon + Citowett	1½	4.5	4.5	2.5	558.7
MSMA	1½	5.5	6.0	0.3	632.2
MSMA	3	7.3	9.5	1.3	615.9
MSMA	6	7.3	9.8	4.0	501.1
MSMA	12	8.5	10.0	5.0	435.5
MSMA directed	6	7.3	9.3	0.0	613.7
MSMA directed	12	8.8	9.3	0.5	616.4
LSD .05		1.5	2.0	1.0	135.4
.01		2.0	3.0	1.4	183.1

[1/] Applied April 30, 1974. Yellow nutsedge 8-12 inches.

[2/] Control or injury rated 0 to 10: 0 = no effect; 10 = kill.

The effect of dry versus wet soil surface on post-emergence onion herbicides. Kempen, H. M. Four herbicides were applied as topical sprays in 35 or 70 gpa over Southport White Globe onions infested with London rocket. Onions were at the 2 true leaf stage and the weed 2-6 inches. Soil type was San Emidgio silty clay loam.

The soil was wetted prior to treatment by sprinkler irrigation. A rainfall of 1 inch fell two days after treatment.

Results in the table indicate chloruxuron plus nonphytotoxic oil and methazole may have been slightly more toxic to onions where applications were made to dry soil. Oxadiazon seemed more effective on wetted soil. (Coop. Extension, Univ. of California, Bakersfield.)

Wet versus dry soil on post-emergence onion herbicides

		Wet soil			Dry soil		
		weeds		onion	weeds		onion
Treatment	lb/A	no.	wt.	injury	no.	wt.	injury
Untreated	-	15.3	21.1	0.7	11.7	36.1	0.7
Chloruxuron + oil	1	2.9	5.9	1.0	2.7	1.2	1.0
Chloruxuron + oil	2	0.0	0.0	1.0	0.0	0.0	2.3
Methazole	1/2	2.3	5.1	0.7	1.3	4.6	2.3
Methazole	1	0.0	0.0	2.7	0.0	0.0	3.7
Nitrofen (WP)	3	11.3	11.1	0.3	13.7	14.1	0.7
Nitrofen (WP)	6	5.3	5.2	1.0	10.0	6.0	0.3
Oxadiazon	1/2	3.3	2.5	0.7	9.3	5.7	1.0
Oxadiazon	1	2.7	0.5	0.7	8.3	2.6	1.3
LSD .05			8.8			3.7	

Evaluation of weed number and weights made 3/22/74 (grams/plant).
Evaluation of onion injury made 4-4-74 on 0 to 10 basis: 0 = no effect; 10 = kill.
Oil used was nonphytotoxic with UR rating over 93.

Effects of adjuvants on chloruxuron performance in onions. Kempen, H. M. A trial was established on March 13, 1974 where chloruxuron was applied to second leaf White Globe onions infested with hedge mustard 4 to 10 inches tall. Soil type was San Emigdio sandy loam. Temperature was 70F. The field was sprinkler irrigated. Two rates of chloruxuron (2 and 4 lb/A) were combined with 1/2% v/v of 9 locally distributed wetting agents in comparison to chloruxuron alone or with 1% v/v of nonphytotoxic oil in 6 replications.

Onion injury evaluations showed that chloruxuron alone caused no damage; nonphytotoxic oil, Colloidal's Tronic(R) and Helena Chemical's Agridex(R) (a blend of nonphytotoxic oil and wetting agent) were slightly injurious but all other wetting agents caused more injury. Yet little visible evidence of injury was present after two months.

Yield measurements indicated reduced yields of 10-15% occurred with most wetting agents and nonphytotoxic oil. Exceptions were Colloidal's X-77(R) and Colloidal's Tronic(R) or chloruxuron alone at either rate.

Measurements of weed weights showed all treatments reduced plant growth from 80 to 93% with higher rates of chloruxuron giving better control. The three best adjuvants were Colloidal's Tronic(R), Helena Chemical's Agridex(R) and Bakersfield Ag-Chem's Spred-Stick(R). (Cooperative Extension, Univ. of California, Bakersfield.)

Field sandbur control in bluegrass lawn. Alley, H. P. and G. A. Lee. Field sandbur is one of the most serious weed infestations in lawns in the southeastern Wyoming area. Infestations completely eliminate the use of some lawns when the burs mature in early summer.

Exploratory treatments were applied to a lawn known to be heavily infested with field sandbur on March 26, 1974 prior to seed germination. Treatments were applied with a three nozzle knapsack sprayer in a total of 40 gpa. The plot area was sprinkled immediately after herbicide application.

At the 5/15/74 evaluation date it was apparent that CGA 17020 at 1.0 and 2.0 lb/A had retarded the growth of the bluegrass with CGA 24705 at 2.0 lb/A causing some leaf yellowing. None of the retardation or leaf yellowing was apparent on the 9/16/74 evaluation date.

On September 6, 1974 the field sandbur plants growing in the most effective treatment plots were counted and compared to counts from the non-treated lawn area to determine the effectiveness of the treatments. Counts showed 26 sandbur plants in an area 9 ft by 25 ft which was treated with 8 lb/A DCPA, 111 sandbur plants where 8.0 lb/A siduron was applied as compared to 376 in a respective non-treated lawn. DCPA was by far the most effective herbicide, reducing the field sandbur infestation by better than 90 percent. An early spring application followed by an early summer application of DCPA may eliminate the problem.

Benefin at 1.5 lb/A, bensulide at 10.0 lb/A, CGA 17020 at 1.0 and 2.0 lb/A, and CGA 24705 at 2.0 lb/A were ineffective. (Wyoming Agric. Expt. Sta., Laramie, SR-625.)

Weed control in Scotch pine Christmas trees. Alley, H. P., G. A. Lee and A. F. Gale. Field sandbur and annual broadleaf weeds are a problem to Christmas tree production. Besides affording competition during establishment and growth, sandbur can be a more serious problem during harvest of the trees, especially for the individual - select and harvest program.

The data presented in the attached table were obtained from a series of plots designed for visitation of participants at the Rocky Mountain Christmas Tree Association Meeting in June 1974.

All treatments were applied with a knapsack spray unit in a total volume of 40 gpa water directly over 3-year-old Scotch pine. Plots were single-row, 60 ft long, randomized with three replications. The soil from the experimental site contained 1.9% O.M., with a pH of 7.3, 79.2% sand, 10.8% silt, and 10% clay.

Field sandbur and horseweed were the predominant weed species with a lesser infestation of common sunflower and puncturevine. Weed growth formed an erect dense canopy at time of fall applications and a flat - prostrate cover when spring applications were made.

Visual evaluations were made on June 20, 1974, approximately 8 and 3 months, respectively, following fall and spring applications.

All treatments except the 0.8 lb/A of atrazine gave 100% control of the broadleaf weeds. Six of the fall treatments gave 90% or better control of field sandbur, whereas nine spring treatments gave 90% or greater control. (Wyoming Agric. Expt. Sta., Laramie, SR-630.)

Weed control in Scotch pine Christmas trees resulting from spring and fall applications

Treatment	Rate/Aai	Percent weed control[1/]			
		Sandbur	Horseweed	Puncture-vine	Sunflower
		Fall Application (10/2/73)			
atrazine 80W	0.8	28	50	37	43
atrazine 80W	1.2	47	100	100	100
atrazine 4L	0.8	82	100	100	100
atrazine 4L	1.6	86	100	100	100
simazine 80W	1.6	90	100	100	100
simazine 80W	2.4	93	100	100	100
atrazine + simazine	0.4 + 0.4	90	100	100	100
atrazine + simazine	0.8 + 0.8	90	100	100	100
GS 14254 50W	0.8	85	100	100	100
GS 14254 50W	1.2	93	100	100	100
GS 14254 50W	1.6	96	100	100	100
cyanazine 80W	1.6	40	100	100	100
cyanazine 80W	2.4	75	100	100	100
		Spring Application (3-19-74)[1/]			
atrazine 80W	0.8	62	100	100	100
atrazine 80W	1.2	74	100	100	100
atrazine 4L	0.8	81	100	100	100
atrazine 4L	1.6	93	100	100	100
simazine 80W	1.6	97	100	100	100
simazine 80W	2.4	99	100	100	100
atrazine + simazine	0.4 + 0.4	92	100	100	100
atrazine + simazine	0.8 + 0.8	98	100	100	100
cyanazine 80W	1.6	61	100	100	100
cyanazine 80W	2.4	70	100	100	100
simazine 4L	1.6	98	100	100	100
simazine 4L	2.4	98	100	100	100
GS 14254 3.0 E.C.	0.8	84	100	100	100
GS 14254 3.0 E.C.	1.2	90	100	100	100
GS 14254 3.0 E.C.	1.6	96	100	100	100

[1/] Weed control evaluations made 6/21/74.

Conversion of bermudagrass to perennial ryegrass turf. Elmore, C. L., E. J. Roncoroni, L. S. Frey, and L. B. Fitch. Glyphosate was evaluated at three locations for control of established bermudagrass before seeding a cool season turfgrass mix.

Glyphosate at 1, 2, 4 and 6 lb/A were applied to plots 20 ft by 20 ft or 25 ft by 25 ft. Treatments were replicated 4 times and applied with a CO_2 pressure sprayer in 40 gpa water to established bermudagrass turf 2 to 6 inches in height. Treatments were made at location 1 on 9/19/73, location 2 on 10/5/73 and 10/12/73 at location 3. The following procedure was used at each location.

Twenty-one days after glyphosate treatment the entire plot area was aerated with 5/8 inch plugs, then verticut at a 1/2 inch depth. Turf thatch was removed.

Each treatment was divided into subplots; half of each plot was again verticut at a 1/2 inch depth. The entire plot was again swept to remove thatch.

A 1:1 mixture of perennial ryegrass varieties "Manhattan" and "Pennfine" were seeded over the entire plot at the rate of 4 lbs of seed per 1,000 sq ft. The area was then watered after seeding and kept moist for seed germination.

In February, siduron at 10 lb/A was applied over the entire plot to control bermudagrass seedlings.

Silvex at 1 lb/A was applied at location 1 in June, 1974, to suppress bermudagrass regrowth.

Bermudagrass control and ryegrass vigor were evaluated (table). (Cooperative Extension, Univ. of California, Davis, Sacramento Co., and Sutter Co.)

Table 1. Bermudagrass control

		Quadrat bermudagrass control[1/]		Percent bermudagrass present	
		Location 1	Location 2	Location 2	Location 3
Herbicide	lb ai/A	6/10/74	5/24/74	8/29/74	8/26/74
glyphosate	1	5.5	-	-	90.0
glyphosate	2	9.5	5.0	83.8	58.8
glyphosate	4	19.5	1.8	65.0	16.3
glyphosate	6	-	12.5	45.0	-
control	-	0	1.0	87.5	90.0

[1/] Average cells (20 - 4 in circles per plot) free of bermudagrass (weed free = 20).

Table 2. Ryegrass vigor

Herbicide	lb ai/A	Location 1 3/20/74	Location 2 3/18/74	Location 3 11/27/73
glyphosate	1	8.9	-	8.4
glyphosate	2	8.5	9.0	8.0
glyphosate	4	9.0	8.0	7.9
glyphosate	6	-	9.3	-
control	-	7.6	8.8	8.3

PROJECT 5. WEEDS IN AGRONOMIC CROPS

D. A. Brown, Project Chairman

SUMMARY

Thirty-nine research reports were submitted for the Agronomic Crops section. Ten crops were reported on by investigators working in Arizona, California, Colorado, New Mexico, Utah and Wyoming.

Alfalfa. Five reports concerning annual weed control in alfalfa were submitted. In the stand establishment report 6 herbicides gave 91% or better weed control with EPTC being outstanding treatment. In an established stand, under dryland conditions, metribuzin, terbacil and simazine gave excellent control. None of the treatments evaluated gave satisfactory yellow starthistle control in California. Chlorpropham + PPG - 124 and DCPA gave good dodder control in established alfalfa in California and Utah.

Barley. Three reports were submitted concerning wild oat control. Major emphasis was placed on post emergence compounds.

Corn. Nine reports from 3 states were submitted relating to weed control in corn. In California, glyphosate and MSMA applied in fall gave acceptable johnsongrass control in corn crop that followed. Numerous herbicides or combinations of herbicides gave excellent annual weed control in Utah and Wyoming trials.

Cotton. Three reports were received from each Arizona and New Mexico. In Arizona trial emphasis was placed on level of cotton tolerance to herbicides applied post-emergence. New Mexico trials explored effect of dinitroaniline herbicides on annual morningglory control and cotton yields.

Field Beans. Three reports were submitted from Wyoming concerning control of annual weeds in field beans. Numerous herbicides or combinations gave commercially acceptable weed control with good crop selectivity.

Fallow. Two reports were submitted from Wyoming where various herbicides were evaluated in fallow systems. Glyphosate alone or in combination with atrazine or cyanazine was the only treatment giving satisfactory control of volunteer wheat and downy brome.

Milkvetch. A progress report from Wyoming compared 8 herbicide treatments for annual weed control in cicer milkvetch. Terbacil, metribuzin and GS-14254 gave outstanding annual weed control.

Pasture. One paper from California was submitted where several herbicides were evaluated for foxtail barley control in an established birdsfoot trefoil-ladino clover pasture. Carbetamide and pronamide gave excellent weed control but reduced the stand of clover.

Sugarbeets. Four papers concerning weed control in sugarbeets were submitted. Papers dealt with mainly comparison of new preplant and post-emergence herbicides to standard materials. Several materials or combination showed good promise.

Wheat. Two papers were submitted on the topic of post-emergence control of wild oats. AC-84777, SD-29761 and HOE-23408 continue to show promise. Two reports from Colorado and Wyoming evaluated a number of herbicides for downy brome control. A paper from Arizona concerned control of Brassica japonica in border irrigated wheat.

Weed control in seeded alfalfa. Lee, G. A., H. P. Alley and A. F. Gale. The study was conducted at the Torrington Agricultural Substation to evaluate preplant incorporated herbicides for weed control in alfalfa seedling establishment under sprinkler irrigation culture. The herbicides were applied on May 8, 1974 and incorporated to a depth of 1.5 inches with a flex-tine harrow. The alfalfa (variety Ranger) was planted at a rate of 4 lb/A with a grain drill attachment on May 8, 1974. Each plot was 1 sq rd in size and each treatment was replicated three times. The herbicide treatments were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier. Conditions at the time of herbicide application were: air temperature 75F, soil temperature 67F, relative humidity 35%, wind calm and skies clear. The soil at the location is classified as a sandy loam with 69% sand, 19% silt, 12% clay, 2.1% organic matter and 7.3 pH. The soil contained ample moisture but the plot area was sprinkler irrigated with .5 inches of water within 12 hours of herbicide application.

The weed population consisted of redroot pigweed, common lambsquarter, black nightshade, ladysthumb and green foxtail. At the time of evaluation, 43 days after application, the nontreated check plots had a weed density of 40% ground cover comprised of 80% broadleaved weed species and 20% grass weed species. Percent weed control was obtained by visual evaluation.

Six of the 25 herbicide treatments resulted in 91.7% or better control of all weed species present. The best weed control was obtained with EPTC alone or in combination with profluralin, A-820, nitralin or AC-92553. All treatments resulted in 90% or better control of green foxtail except HOE-22870 at 1 lb/A. Black nightshade was the most difficult species to control with 17 of the treatments resulting in 90% or less control. Trifluralin at .5 lb/A and molinate + propanil at 2 + 2 lb/A resulted in substantial alfalfa stand reduction. Evaluations later in the growing season indicated that all herbicide treated plots contained an adequate alfalfa stand. (Wyoming Agric. Expt. Sta., Laramie, SR-620.)

Effect of preplant incorporated herbicides on alfalfa seedling stand and percent weed control at Torrington, Wyoming

Treatment	Rate lb/A	Alfalfa S[1/]	Alfalfa V[2/]	Percentage control: Redroot pigweed	Common lambs-quarters	Black night-shade	Lady-thumb	Green foxtail
EPTC (6E)	4.0	23	0	95 a	100 ab	100 a	97 a	98 a
EPTC (Encap.)	4.0	20	0	99 a	99 ab	99 a	96 a	99 a
pronamide	.5	10	0	25 c	25 d	23 fg	67 a	92 ab
pronamide	1.0	18	0	72 b	86 c	52 d-f	70 a	96 ab
S-6044	3.0	23	0	96 a	96 a-c	63 b-e	87 a	95 ab
S-6044	4.0	27	0	97 a	97 a-c	70 a-d	100 a	96 ab
profluralin	.75	10	0	96 a	93 a-c	23 fg	95 a	95 ab
profluralin	1.0	13	0	97 a	96 a-c	73 a-d	100 a	97 ab
profluralin + EPTC	.5 2.0	15	0	98 a	98 ab	96 ab	93 a	98 ab
A-820	1.0	12	0	92 ab	95 a-c	77 a-d	100 a	97 ab
A-820	1.5	18	0	90 ab	93 a-c	85 a-c	73 a	96 ab
A-820 + EPTC	1.0 2.0	20	0	97 a	98 ab	97 a	93 a	99 a
trifluralin	.5	32	0	91 ab	91 a-c	23 fg	65 a	98 ab
trifluralin + EPTC	.5 2.0	19	0	93 a	98 ab	93 ab	70 a	97 ab
nitralin	.75	18	0	92 ab	94 a-c	50 d-f	98 a	94 ab
nitralin + EPTC	.75 2.0	17	0	97 a	99 ab	97 a	92 a	98 a
AC-92553	1.0	13	0	94 a	99 ab	57 c-e	73 a	98 ab
AC-92553	1.5	27	0	98 a	96 a-c	85 a-c	93 a	98 ab
AC-92553 + EPTC	1.0 2.0	22	0	94 a	100 a	93 ab	95 a	99 a
molinate + propanil	2.0 2.0	33	0	87 ab	88 c	50 d-f	93 a	95 ab
HOE-22870	1.0	0	0	0 d	0 e	0 g	0 b	77 c
HOE-23408	1.0	0	0	0 d	0 e	0 g	0 b	90 d
benefin	1.1	17	0	93 a	93 a-c	37 ef	93 a	98 ab
dinitramine	.66	18	0	93 a	96 a-c	63 b-e	83 a	96 ab
dinitramine + EPTC	.5 2.0	23	0	95 a	99 ab	94 ab	78	98 a

1/ Percent stand of alfalfa.

2/ Percent vigor reduction of alfalfa plants.

3/ Means with the same letter(s) are not significantly different at the .05 level.

Evaluation of fall applied herbicides for weed control in semi-dormant dryland alfalfa. Alley, H. P. and G. A. Lee. The herbicides, listed in the following table, were applied to a heavily weed-infested, low productive dryland alfalfa field on October 26, 1973 at the Sheridan Agricultural Experiment Station. Soil analysis showed the soil class to be a sandy loam with a pH of 7.1, 3.5% O.M., 69% sand, 16% silt, and 15% clay.

The weed species complex consisted primarily of downy brome and field pepperweed, with a lesser population of tansy mustard and meadow salsify. The downy brome had been grazed by sheep and had 1.0 to 1.5 inch growth; the annual broadleaf weeds, tansy mustard and field pepperweed, were in the rosette stage at time of treatment. There was some green growth near the crown of the alfalfa plants.

All herbicides were applied with a three-nozzle knapsack spraying unit in a total volume of 40 gpa water. The plots were one sq rd, randomized, with three replications. At time of evaluation, it was apparent that due to severe drought conditions, clipping and separation of alfalfa and weed species would not give accurate weed control or chemical phytotoxicity data. The percent weed control was determined by visual evaluations.

Nine of the herbicide treatments gave 90% or better control of the annual grass and broadleaf weeds common to the area. None of the herbicides were effective toward meadow salsify, a biennial which develops a deep fleshy taproot. Pronamide at all rates of application showed excellent activity toward downy brome but was weak on the annual broadleaf weeds. A comparison of the weed control efficiency of the four formulations of GS-14254 indicate that the 3.0 lb/gal E.C. was not as effective on the annual broadleaf weeds as the other three formulations. There is no explanation for this difference at this time.

Metribuzin at 0.75 lb/A, terbacil at 1.0 lb/A, simazine at 1.2 lb/A, and the 3.2 E.C. formulation of GS-14254 at 1.6 lb/A all gave 100% weed control with no apparent phytotoxicity to the alfalfa. (Wyoming Agric. Expt. Sta., SR-628.)

Weed control in dormant, dryland alfalfa (Sheridan Agricultural Experiment Station, Sheridan, Wyoming)

		Percentage control by species			
Treatment	Rate (lb/Aai)	Downy brome	Field pepperweed	Tansy mustard	Meadow salsify
GS 14254 (3.0 E.C.)	1.2	100 A	20 BC	100 A	0.0
GS 14254 (3.0 E.C.)	1.6	100 A	23 BC	100 A	0.0
GS 14254 (3.2 E.C.)	1.2	100 A	43 B	100 A	0.0
GS 14254 (3.2 E.C.)	1.6	100 A	100 A	100 A	0.0
GS 14254 (50W)	1.2	99+A	100 A	100 A	0.0
GS 14254 (50W)	1.6	96 AB	100 A	100 A	0.0
GS 14254 (80W)	1.2	98 AB	100 A	100 A	0.0
GS 14254 (80W)	1.6	90 B	100 A	100 A	0.0
pronamide	0.5	99 A	0.0 C	23 C	0.0
pronamide	0.75	97 AB	0.0 C	27 C	0.0
pronamide	1.0	97 AB	28 BC	43 B	0.0
simazine (80W)	1.2	100 A	100 A	100 A	0.0
simazine (80W)	1.6	94 AB	100 A	100 A	0.0
terbacil	1.0	100 A	100 A	100 A	0.0
metribuzin	0.75	100 A	100 A	100 A	0.0

1/ Applied 10/26/73, evaluated 6/28/74.

2/ All data are means of three replications.

3/ Treatments followed by the same letter are not significantly different at the 5 percent level by Tukeys studentized range test.

Herbicides for yellow starthistle control in dryland alfalfa. Smith, N. L., S. R. Radosevich, and W. H. Brooks. An infestation of yellow starthistle can be a serious problem in alfalfa due to its competition, lowering of hay palatability and its toxic effect on horses.

An established alfalfa field heavily infested with yellow starthistle was selected to evaluate several herbicides for their effectiveness. Treatments were applied February 7, 1974 when the yellow starthistle was in the seedling to early rosette stage. At this time there was a heavy cover of dead starthistle remains from the previous year's growth. A 10 by 20 ft plot size was chosen using 3 replications. Materials were applied at 29 gpa with the exception of dinoseb + oil where 40 gpa of weed oil was used. Applications were made using a CO_2 constant pressure sprayer. Alfalfa was showing 4-6 inches of new growth when treated. Herbicides tested and results achieved are shown in the following table.

Yellow starthistle control in alfalfa

Herbicide	Rate AI/A (lb)	Control (0=none, 10=complete) 5/17/74
diuron	2.4	1.7
diuron + dinoseb	2.4 + 1.25	4.3
GS-14254	1.6	0.7
GS-14254	2.4	0
2,4-DB ester	0.75	3.3
2,4-DB ester	1.5	5.0
dinoseb	1.9	3.3
dinoseb + oil	1.25 + 40 gpa	6.0
control	-	0

Since near eradication is necessary for acceptable control none of the herbicides tested proved satisfactory. (Coop. Ext., Univ. of California, Davis and Mendocino Co.)

Chlorpropham and DCPA for control of dodder in alfalfa. Baskett, R. S., N. L. Smith and S. R. Radosevich. An alfalfa field that had been heavily infested with dodder the previous year was chosen to test the efficacy of DCPA and chlorpropham for dodder control. Dodder seems to first appear in a field in the area adjacent to the border where the alfalfa cannot be mowed as close to the soil surface. All plots were initially treated March 22, 1974, two weeks prior to first cutting. Rainfall totaling 1 inch occurred two days after application. Additional treatments were applied June 16 and July 18, 1974 to certain plots. A plot size of .1 acre with the irrigation border in the center of each plot was used. In addition to control plots, untreated plots which were closely hand mowed on top of and on either side of the irrigation border were included. Chlorpropham was applied as a granule using a hand shaker, a CO_2 sprayer being used to apply DCPA in 25 gpa of water. Chlorpropham formulation contained PPG-124, an agent to prolong soil activity. The entire field had been treated with diuron in December, 1973. While this experiment was primarily concerned with dodder control the test site contained enough yellow foxtail to also record its response to these herbicides.

The number of plants and the area infested by dodder and visual rating of yellow foxtail control were determined on July 18 and September 10, 1974. Results are presented as the average of four replications and shown in the following table.

Dodder and yellow foxtail control in established alfalfa

Herbicide	Rate lb(ai)/A			Dodder no. of plants		Dodder area sq ft		Yellow foxtail control[1/]	
	3/22/74	5/16/74	7/18/74	7/18/74	9/10/74	7/18/74	9/10/74	7/18/74	9/10/74
DCPA	10.5	-	-	1.8	4.8	3.5	54.5	5.0	4.0
DCPA	10.5	10.5	-	1.5	2.8	1.8	29.5	7.0	6.5
DCPA + chlorpropham + PPG-124	10.5	6	-	2.3	4.0	5.3	70.8	5.8	5.3
chlorpropham + PPG-124	9	-	-	0.3	0.5	0.8	1.5	7.8	7.5
chlorpropham + PPG-124	6	3	-	2.8	3.3	8.3	48.5	5.8	3.8
chlorpropham + PPG-124	3	3	3	7.0	15.3	17.5	117.8	5.0	2.3
mowed	-	-	-	2.5	5.5	6.3	38.3	1.3	1.3
control	-	-	-	2.8	2.3	13.8	35.0	0.5	0

[1/] 0 = no control, 10 = complete control

Chlorpropham at 9 lb/A applied prior to first cutting was superior to any other treatment for control of dodder and yellow foxtail. Mowing failed to reduce the dodder stand significantly over the control. The combination treatment of DCPA followed by chlorpropham exhibited no advantage over DCPA alone. No injury was observed to the alfalfa from any treatment. (Coop. Ext., Univ. of California, San Joaquin Co. and Davis.)

Dodder control in alfalfa seed fields in Utah. Evans, J. O. Five herbicide treatments were evaluated for control of field dodder in alfalfa seed fields. Plots 30 ft by 600 ft were established in triplicate in a randomized block design on March 22 near Delta, Utah. The herbicides were incorporated by border irrigating the entire field within 12 hours after treatment. No dodder germination had taken place when the herbicides were applied and only minor alfalfa growth was observed. Weed control evaluations were made in mid-August just prior to seed harvest by dividing each plot into quarters and visually estimating the percent dodder control in each quarter. The control values in the table represent an average of twelve determinations per treatment. Yields were not determined for the experiment but no treatment appeared to cause sufficient injury to alfalfa to be reflected in seed production. Satisfactory to excellent control was observed with chlorpropham granules with or without PPG-124. When chlorpropham liquid formulations were used some initial stunting was noted for the first two or three weeks and the dodder control was not as good as the granular formulations. PPG-124 formulated into the granular chlorpropham increased the dodder control very little over the straight granular chlorpropham. Dodder control with DCPA was very good while control with pronamide was less than satisfactory. (Utah Agricultural Experiment Station, Logan.)

Dodder control in alfalfa seed fields

Treatment	Rate lb/A	Formulation	Dodder control	Alfalfa injury index*
			%	
chlorpropham + PPG124	5 + 1.25	liquid	62.9	1.2
chlorpropham + PPG124	5 + 1.25	granule	88.4	0
chlorpropham	5	granule	80.2	0
DCPA	10	W.P.	73.3	0.3
pronamide	1.5	W.P.	47.3	0
control			6.2	0

*Injury index 0-10, 0 = no injury, 10 = complete kill.

Postemergence wild oat control in barley. Radosevich, S. R., L. A. Jackson, and N. L. Smith. An experiment was established on January 29, 1974 in cooperation with the University of California Farm Division, Davis to compare several postemergence herbicides for wild oat control and barley selectivity. Herbicides tested were difenzoquat, WL-29761, and barban. Treatments were applied in 29 gallons/acre of water using a CO_2 backpack sprayer. 0.5% (vol/vol) surfactant (X-77^R) was added to all treatments of difenzoquat. At the time of application barley was 2 to 6 inches high and in the 3 to 5 leaf stage. Wild oats were 2 to 5 inches tall and at the 3 to 4 leaf stage of development. The soil was wet but foliage dry at application.

The experiment was conducted as a randomized block design with 4 replications. Each plot consisted of an area 10 x 20 feet (200 ft^2). Visual evaluations of crop injury and wild oat control were made after 7 days and crop injury was again evaluated after 23 days. Stand counts of wild oat and barley within 2 ft^2 of plot were made on May 1, 1974.

Results of this experiment are provided in the following table. All herbicides tested provided good wild oat control when compared to a non-treated plot. Both difenzoquat and WL-29761 controlled wild oat better than barban. However, the highest rate of difenzoquat and 0.5 and 1.0 lb/A WL-29761 injured barley by the second date of evaluation. The 0.75 lb/A rate of difenzoquat also injured barley to some degree. This injury was observed as foliage burn and by the May 1 evaluation date no crop injury from any treatment was evident. (Botany Dept., Univ. of California, Davis, 95616.)

Effect of three postemergence herbicides for wild oat control and barley selectivity[1/]

Treatment	Rate lb(AI)/A	Barley injury[2/]		Wild oat control[2/]	Stand count/2 ft^2	
		2/6/74	2/22/74	2/6/74	Barley	Wild oat
difenzoquat	0.62	0	0.4	7.3	54.5	0
difenzoquat	0.75	0	0.8	1.8	56.5	0
difenzoquat	1.5	0	2.6	5.5	55.5	0.3
WL-29761	0.25	0	0	1.5	52.5	1.5
WL-29761	0.5	0	2.8	5.3	53.3	0.3
WL-29761	1.0	0	5.8	4.5	50.5	0
barban	0.38	0	0.3	3.0	53.0	2.5
control	-	0	0.3	3.3	48.3	10.0

[1/] Averages of 4 replications.

[2/] Visual evaluation of control or injury (0 = no control or injury, 10 = complete control or injury).

Wild oat control in barley. Zimdahl, R. L. and J. M. Foster. A field experiment was established to evaluate five herbicides for the control of wild oats in Moravian brewing barley and to determine if spray angle, volume of spray solution per acre, or combination with 2,4-D or MCPA had an effect on the efficacy of two of the herbicides. All treatments were replicated four times on 6 by 30 ft plots in a random block design. All herbicides were applied in 10 gpa (except as noted in the discussion). The soil was a sandy clay loam with 47% sand, 23% silt, 30% clay, 2% organic matter and a pH of 7.8. The barley was seeded on April 3 and an area 4.9 by 25 ft was harvested on August 9 with a Hege small plot combine. The grain was dried, screened, and the weight of barley per plot, and the percent wild oats calculated. Additional application information is shown in Table 1.

Statistical analysis of the replicated data summarized in Table 2 showed no differences in yield of barley. There was a difference in the degree of wild oat control shown by the visual ratings. The best control was given by HOE 23408 which appears to be very promising for the selective control of wild oats. Difenzoquat did not perform as well as in 1973 but gave satisfactory control when applied at the higher rate of 1 lb ai/A. Surprisingly, it gave very good control when applied at 1 lb ai/A at the full tiller stage of the wild oat. Triallate and barban were approximately equal in control and continued to be the best of the currently available commercial herbicides. SD-29761 was successful only at the higher rates. The yield of wild oats was not reduced below that of the check and was significantly higher at the lower rates.

Although there was no significant effect on yield, there was an effect on wild oat control when difenzoquat or SD-29761 were combined with 2,4-D or MCPA amine. Based on these data, we suspect that the combinations may not be as good for wild oat control.

In greenhouse studies, we evaluated the effect of the amount of solution applied per acre in the range of 5-30 gpa and the effect of a 45 as opposed to 90° spray angle. These studies lead us to suspect that there is an effect of total spray volume on the control of wild oats by difenzoquat and SD-29761. The data are not sufficiently reliable at this time to predict the effect and further experiments will be conducted. Contrary to our initial hypothesis, the greenhouse data also indicated that a 90° spray angle was more efficient in terms of control than the 45° angle. In the field we did not observe any effect of changing the total spray volume or changing the spray angle.

The last two columns in Table 2 show the pounds of wild oat seed per acre based on the wild oat seed screened from the harvested samples and a conversion of these data to the number of wild oat seeds available for seeding each square foot on one acre. It is important to note that, with the exception of the four treatments starred in Table 2, all of the herbicides did reduce the number of wild oat seeds deposited on an acre. HOE 23408 reduced the reseeding of wild oats the most. We propose that for wild oat control it may be equally as important to reduce the wild oat seed population in the soil as it is to increase the yield in one year. (Weed Research Laboratory, Dept. of Botany and Plant Pathology, Colorado State Univ., Fort Collins.)

Table 1. Application data

Item	Post plant incorporated	Postemergence: Stage of wild oat growth		
		1-2 leaves	3-5 leaves	fully tillered
treatments[1/]	1,2	3,4	2,4,5-23	24,25
date	4/8	5/3	5/22	6/6
temperature				
air	62	72	51	64
soil	57	67	58	62
stage of barley growth	none	2-3 leaves	4-6 leaves	fully tillered
soil condition	dry	dry	dry	sticky

[1/] See Table 2 for complete treatments.

Table 2. Treatments, control ratings, and yield data

Herbicide	Rate lbs ai/A	Wild[1/] oat control	Barley[2/] yield bu/A	Wild oats[3/] lbs/A	Wild oats[3/] seeds/ sq ft
Post plant incorporated					
triallate	1.5	47	80	136	81
triallate + difenzoquat @ (3-5 leaf stage)	1.0 + 0.625	58	78	159	95
1-2 Leaf stage of wild oats					
barban	0.5	59	68	140	84
barban + difenzoquat @ (3-5 leaf stage)	0.25 + 0.625	58	73	111	66
3-5 Leaf stage of wild oat					
difenzoquat	0.625	37	71	193	115
difenzoquat	0.75	45	71	127	76
difenzoquat	1.0	69	69	129	77
difenzoquat (in 5 gpa)	0.75	46	46	190	113
difenzoquat(in 20 gpa)	0.75	61	61	157	94
difenzoquat @45° angle	0.75	51	74	171	102
difenzoquat + barban	0.38 + 0.19	48	72	159	95
difenzoquat + 2,4-D amine	0.75 + 0.375	29	72	166	99
difenzoquat + 2,4-D amine	0.75 + 0.5	29	64	163	97
difenzoquat + MCPA amine	0.75 + 0.5	31	70	166	99
SD-29761	0.25	48	70	260	155*
SD-29761	0.5	60	76	218	130*
SD-29761	1.0	77	69	162	97
SD-29761 (in 20 gpa)	0.5	60	68	190	113
SD-29761 @ 45° angle	0.5	60	66	262	156*
SD-29761 + 2,4-D amine	0.5 + 0.5	45	56	189	113
SD-29761 + MCPA amine	0.5 + 0.5	27	63	219	131*
HOE 23408	1.0	70	71	93	55
HOE 23408	2.0	80	64	86	51
Full tiller stage of wild oat					
difenzoquat	0.75	53	70	120	71
difenzoquat	1.0	70	69	94	56
check	-	-	72	245	146*

[1/] 0 = no control, 100 = complete wild oat control. Ratings are an average of three separate observations of four replications.

[2/] Yields determined by combine harvest of 4.9 x 25 ft of each plot.

[3/] Wild oat data calculated from screened samples of barley. One pound of wild oats contains approximately 26,000 seeds.

Wild oat control in barley. Lee, G. A. and H. P. Alley. The screening trial was established near Sheridan, Wyoming to determine the effectiveness of several postemergence applied herbicides for wild oat control in barley. At the time of treatment on May 9, 1974, the barley (variety Steptoe) and wild oats were in the 3- to 5-leaf stage of growth. Plots were 1 sq rd in size and each herbicide treatment was replicated three times in a randomized complete block design. The soil at the location is classified as a silt loam (28% sand, 57% silt, 15% clay, 4.5% organic matter and 7.3 pH). Conditions at the time of herbicide application were: air temperature 50F, soil temperature 65F, relative humidity 50%, wind 10 mph, and skies cloudy. The soil surface was dry but moist at a depth of 1.5 to 2.0 inches. No precipitation was received until three weeks after initial applications. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier. All difenzoquat treatments were applied at a 45° and 180° angle in relation to the soil surface. Delivery angle was compared to determine if differences in coverage occurred. Percent control was determined by clipping the wild oat plants from an area 1 by 1 ft and comparing the dry weight of harvested forage in the treated area to the nontreated check plots.

HOE-23408 at .75, 1.0 and 2.0 lb/A resulted in 96.0, 99.0 and 99.3% wild oat control, respectively. The 2.0 lb/A rate of HOE-23408 did result in severe barley stunting and inhibition of root development. Slight vigor reductions in barley plants were detected in plots treated with HOE-23408 at .75 and 1.0 lb/A. SD-29761 at .5 and 1.0 lb/A gave 79.7 and 90.7% wild oat control when comparing harvested forage. However, the actual competitive effect of the weed infestation was reduced to a greater extent since SD-29761 at .5 and 1.0 lb/A severely inhibited the wild oat plants remaining. Only slight phytotoxic effects on barley could be discerned in plots treated with SD-29761 at .5 and 1.0 lb/A. Difenzoquat at .75 and 1.0 lb/A, alone and in combination with 2,4-D amine at .5 lb/A resulted in 56.0 to 72.7% wild oat control. The 1.0 lb/A rate of difenzoquat resulted in substantial stunting of wild oats but the actual elimination of plants did not compare with SD-29761 or HOE-23408 at equal rates of application. No significant differences in control could be attributed to the angle of application of difenzoquat. (Wyoming Agric. Expt. Sta., Laramie, SR-609.)

Effect of postemergence herbicides on wild oat populations and barley stands and vigor at Sheridan, Wyoming

Treatment	Rate lb/A	Barley S[1/]	Barley V[2/]	Percentage control Wild oats
difenzoquat	.62	100	0	7.3 i[3/]
difenzoquat	.75	100	0	43.0 gh
difenzoquat	1.0	100	0	72.3 b-e
difenzoquat + 2,4-D amine	.75 + .5	100	0	56.0 e-g
difenzoquat + 2,4-D amine	1.0 + .5	100	0	71.3 c-f
molinate + propanil	.5 + .5	100	0	4.7 i
molinate + propanil	1.0 + 1.0	100	0	15.0 i
molinate + propanil	2.0 + 2.0	100	0	20.3 hi
SD-29761	.25	100	0	21.7 hi
SD-29761	.5	100	3	79.7 a-e
SD-29761	1.0	100	7	90.7 a-d
*difenzoquat	.62	100	0	56.7 e-g
*difenzoquat	.75	100	0	44.7 f-h
*difenzoquat	1.0	100	0	68.7 d-g
*difenzoquat + 2,4-D amine	.75 + .5	100	0	59.7 e-g
*difenzoquat + 2,4-D amine	1.0 + .5	100	0	72.7 a-e
HOE-23408	.75	100	7	96.0 a-c
HOE-23408	1.0	100	10	99.0 ab
HOE-23408	2.0	50	43	99.3 a
check		100	0	0 i

1/ Percent barley stand.

2/ Percent vigor reduction of barley plants.

3/ Means with the same letter(s) are not significantly different at the .05 level.

* Herbicide treatments directed into the foliage at a 45° angle.

Johnsongrass control in field corn. S. R. Radosevich, N. L. Smith and F. Kegel. Johnsongrass is a severe weed problem for corn production in the Sacramento River delta. For this reason an experiment was established near Walnut Grove, California to evaluate johnsongrass control from several herbicides in combination with tillage.

An area infested with johnsongrass and used in corn-cereal rotation was selected. The cereal was initially harvested and the johnsongrass allowed to regrow. The experimental area was then divided into three levels of tillage: no disking, disking before herbicide application (7/16/73) and disking after herbicide application (9/20/73). On September 4, 1973, applications of MSMA, and three rates of glyphosate were made. Johnsongrass regrowth was in the late boot to early heading stage of growth. The experiment was conducted as a split-plot design with four replications. Herbicide treatments were main plots.

The following spring the entire area was disked, beds formed and corn planted. EPTC was applied immediately before planting to control germinating johnsongrass seedlings. On July 22, 1974 the number of established johnsongrass plants in each subplot were determined. Four rows of each subplot were harvested in October 1974.

Results are presented in Tables 1 and 2. Early tillage alone provided nearly 50% control of rhizomatous johnsongrass. Disking later in the season did not provide this control. Desiccation of exposed rhizomes is believed to account for the control resulting from the July tillage. Either glyphosate or MSMA application onto johnsongrass regrowth following a tillage provided acceptable control. Herbicide applications to johnsongrass which was not disked or which was disked 16 days after application resulted in poorer control than treatments disked and allowed to regrow before application. (Botany Dept., Univ. of California, Davis 95616.)

Table 1. Number of johnsongrass plants per 320 feet of row

		Time of disking		
Herbicide	Rate lb/A	None	Before application	After application
glyphosate	2	180.8	55.0	131.8
glyphosate	4	56.0	21.5	64.0
glyphosate	8	56.0	19.0	58.0
MSMA	4	111.5	28.0	96.3
control	-	323.3	129.0	212.8

$LSD_{.05}$ for herbicide = 90.8

$LSD_{.05}$ for disking = 32.8

$LSD_{.05}$ for HxD = 110.3

Table 2. Corn yields (lb/A) resulting from johnsongrass control

Herbicide	Rate lb/A	Time of disking: None	Before application	After application
glyphosate	2	1051	1073	1101
glyphosate	4	1038	993	1038
glyphosate	8	998	959	950
MSMA	4	948	1065	1044
control	-	785	956	932

CV. 8.25%

Evaluation of preplant soil-incorporated herbicides for corn. Evans, J. O. and J. L. Anderson. Two experiments were established to evaluate several herbicides for weed control and field and sweet corn tolerance. The field corn was planted on May 8 in Spanish Fork, Utah into a loam soil that had just been treated with preplant herbicides. The treatments were sprayed broadcast and the entire experiment was tilled in two directions at right angles with a mulch treader to incorporate the herbicides. Sweet corn was planted at Farmington, Utah in a sandy-loam soil on May 7. Herbicides were applied just before planting as broadcast sprays and incorporated immediately with a power incorporator to a depth of 2-3 inches. Weed control evaluations were made in mid July and yields were taken the first of October. Green foxtail evaluations were made in the field corn trial with the thiocarbamate herbicides and alachlor showing the greatest control. The degree of control was not as good with the triazines except when they were used in combination with other herbicides. Broadleaved weed control (mainly lambsquarters and redroot pigweed) was excellent when atrazine was used alone or mixed with another herbicide. Lambsquarter and redroot pigweed control was less satisfactory when the thiocarbamate herbicides were used alone. Likewise the short-lived triazine herbicides, cyanazine and procyazine as well as Herc 22234 were not as effective on the broadleaved species and probably should be used in combination with other materials for acceptable weed control. Only Herc 22234 at the highest dosage expressed notable injury to field and sweet corn. (Utah Agricultural Expt. Station, Logan.)

Influence of several soil incorporated herbicides on weed control and yield of field and sweet corn

	Field Corn				Sweet Corn		
		Weed control		Yield			
Treatment	Rate (lb/A)	Grassy weeds	Broadleaved weeds	% of control	Rate (lb/A)	Weed control Index rating*	Yield (lbs)**
atrazine	3.0	7.3	10.0	116	2.0	9.7	168.5
alachlor	2.0	9.0	6.8	113	-	-	-
cyanazine	2.5	7.0	7.5	104	-	-	-
ethiolate + cyprazine	4.0 + 0.75	6.2	8.9	117	4.0 + 0.75	9.8	193.5
butylate	4.0	9.5	6.0	110	4.0	8.0	207.0
EPTC + R25788	4.0 + 0.5	9.5	8.2	119	4.0 + 0.5	9.2	206.0
atrazine + alachlor	2.0 + 1.5	9.3	9.8	127	1.0 + 1.5	10.0	181.0
atrazine + cyanazine	2.0 + 1.5	8.0	9.0	116	1.0 + 1.5	10.0	161.0
atrazine + butylate	1.5 + 3.0	9.8	9.5	118	1.0 + 3.0	10.0	219.5
alachlor + metribuzin	1.5 + 0.5	8.9	8.5	122	- -	-	-
alachlor + dicamba	1.5 + 0.5	8.7	9.3	124	- -	-	-
atrazine + HERC 22234	2.0 + 1.5	9.0	9.2	101	1.0 + 2.0	10.0	148.0
HERC 22234	3.0	9.3	7.3	94	3.0	7.8	144.5
procyazine	3.0	7.0	7.3	114	-	-	-
butylate + R25788	4.0 + 0.5	9.2	7.4	117	4.0 + 0.5	6.8	185.0
atrazine + vernolate	1.5 + 3.0	8.9	8.4	109	1.0 + 2.0	9.8	167.0
control		0.1	0.5	100	-	0.0	121.0

*Injury rating 0-10, 0 = no effect, 10 = complete kill.

**Fresh ear weight per 90 ft of row.

Evaluation of preplant incorporated herbicides for weed control in corn. Lee, G. A., H. P. Alley and A. F. Gale. The study was initiated to determine the effectiveness of preplant incorporated herbicides for annual weed control in corn under furrow irrigated culture. Plots were established at the Torrington Agricultural Substation on May 7, 1974 and the corn (variety PX-448) was planted on May 10, 1974. All herbicides were incorporated with a flex-tine harrow to a depth of 1.5 inches. Herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier. Conditions at the time of herbicide application were: air temperature 73F, soil temperature 56F, relative humidity 20%, wind 5 mph, and skies clear. The soil at the location is classified as a sandy loam (69% sand, 19% silt, 12% clay and 2.1% organic matter). At the time of treatment, the soil was dry on the surface and moist below. No natural precipitation was received for 30 days after herbicide application.

Weed species infesting the area were black nightshade, redroot pigweed, common lambsquarter, common purslane, kochia, and green foxtail. Weed density at the time of evaluation was 25% ground cover in the nontreated check plots. The total weed population was comprised of 85% broadleaved species and 15% grass species. Actual counts of each species were made 56 days after treatment to obtain percentage control.

All herbicide treatments except MC-8479 at .75 lb/A resulted in 91.3% or better control of black nightshade. CGA-24705 at 2.0 lb/A was the only treatment which gave less than 94% control of redroot pigweed. MC-8479 at .75 lb/A was the only treatment which resulted in less than 92.7% of common lambsquarter. Common purslane was not effectively controlled with CGA-24705 at 2.0 lb/A. Excellent control of kochia and green foxtail was obtained with all herbicides included in the study. Procyazine and CGA-24705 resulted in moderate and severe stunting of corn, respectively. Corn appeared to have excellent tolerance to all other treatments. R-31401 at all rates and cyanazine-4L at 1.5 and 2.0 lb/A gave 100% control of broadleaved weed species and 98.3% or better control of green foxtail. (Wyoming Agric. Expt. Sta., Laramie, SR-613.)

Effect of preplant incorporated herbicides on corn stand and percentage weed control at Torrington, Wyoming

Treatment	Rate lb/A	Corn S[2]	Corn V[3]	Percentage control: Black nightshade	Redroot pigweed	Common lambsquarter	Purslane	Kochia	Green foxtail
procyazine	1.6	100	22	100.0 a[1]	94.0 a	96.3 a	96.0 a	100.0 a	93.0 a
procyazine	2.4	100	33	100.0 a	100.0 a	100.0 a	94.0 a	100.0 a	91.7 a
CGA-24705	2.0	90	63	94.7 a	88.0 a	92.7 a	78.0 a	100.0 a	91.3 a
CGA-24705	2.5	100	68	97.3 a	100.0 a	96.3 a	100.0 a	97.0 a	97.0 a
CGA-24705	3.0	100	60	92.0 a	100.0 a	100.0 a	100.0 a	97.0 a	99.0 a
atrazine-4L	1.2	100	0	100.0 a	100.0 a	100.0 a	100.0 a	97.0 a	98.3 a
butylate	4.0	97	0	100.0 a	100.0 a	92.7 a	100.0 a	100.0 a	100.0 a
R-31401	1.0	100	0	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	99.0 a
R-31401	2.0	100	0	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	99.3 a
R-31401	4.0	100	0	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	98.3 a
MC-8475	.75	100	0	92.0 a	100.0 a	96.3 a	100.0 a	97.0 a	94.0 a
MC-8475	1.5	87	0	91.3 a	100.0 a	96.3 a	100.0 a	100.0 a	95.7 a
MC-8479	.75	97	0	87.2 a	97.0 a	89.0 a	100.0 a	100.0 a	94.3 a
MC-8479	1.5	100	0	91.7 a	97.0 a	96.3 a	100.0 a	100.0 a	99.3 a
cyanazine-4L	1.5	100	0	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	98.3 a
cyanazine-4L	2.0	100	0	100.0 a	100.0 a	100.0 a	100.0 a	100.0 a	99.3 a
cyanazine-4L	3.0	100	0	92.7 a	100.0 a	100.0 a	100.0 a	100.0 a	98.7 a
alachlor	2.5	93	0	95.0 a	94.0 a	100.0 a	96.7 a	91.0 a	98.7 a

[1] Means with the same letter(s) are not significantly different at the .05 level.

[2] Percent stand of corn compared to the stand in the nontreated check plot.

[3] Percent vigor reduction at time of evaluation.

Evaluation of preplant incorporated thiolcarbamate herbicide combinations for weed control in corn. Lee, G. A., H. P. Alley and A. F. Gale. The experiment was established at the Torrington Agricultural Sub-station to compare the effectiveness of preplant incorporated thiolcarbamate herbicide combinations for annual weed control in corn under furrow irrigation culture. Plots were established on May 7, 1974 and the corn (variety PX-448) was planted on May 10, 1974. All herbicide treatments were incorporated to a depth of 1.5 inches with a flex-tine harrow. Applications were made with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier. Conditions at the time of herbicide applications were: air temperature 73F, soil temperature 56F, relative humidity 20%, wind 5 mph, and skies clear. The soil at the location is classified as a sandy loam (69% sand, 19% silt, 12% clay and 2.1% organic matter). The soil was dry on the surface and moist below at the time of herbicide applications. No natural precipitation was received for 30 days after initial treatment.

Black nightshade, redroot pigweed, common lambsquarter, common purslane, and kochia accounted for 85% of the total weed population while green foxtail comprised 15% of the total infestation. The weed density at the time of evaluation was 25% ground cover in the nontreated check plots. Actual counts of each species were made 56 days after treatment to obtain percentage control.

Nine of the 16 thiolcarbamate herbicide combination treatments resulted in 91% or better control of all weed species present. Combinations which included R-31401 gave 100% control of broadleaved weed species and 99% or better control of green foxtail. R-25788 and R-29148 resulted in effectively reducing the incidence of malformed and stunted corn plants. There appeared to be some reduction in EPTC and vernolate activity toward common lambsquarter and purslane when used in combination with R-25788 and R-29148. Green foxtail control of 91.3% or better was obtained with all treatments except EPTC + R-25788 at 3.0 + .25 lb/A. Corn vigor was reduced 10 to 13% in plots treated with vernolate + R-25788 + R-31401 at 2.0 + .167 + 1.0 lb/A and 3.0 + .25 + 1.0 lb/A, respectively, at the time of evaluation. These symptoms could not be detected in late July. (Wyoming Agric. Expt. Sta., Laramie, SR-623.)

Effect of preplant incorporated thiolcarbamate herbicide combinations on corn stand and percentage weed control at Torrington, Wyoming

Treatment	Rate lb/A	Corn S[2]	Corn V[3]	Percentage control: Black night-shade	Redroot pigweed	Common lambs-quarter	Purs-lane	Kochia	Green foxtail
vernolate + R-25788	3.0 + .25	100	0	96 a[1]	91 a	93 ab	85 ab	97 a	93 a
vernolate + R-25788	4.0 + .375	100	0	96 a	91 a	100 a	96 ab	100 a	96 a
vernolate + R-29148	3.0 + .25	100	0	99 a	100 a	100 a	100 a	100 a	95 a
vernolate + R-29148	4.0 + .375	100	0	98 a	100 a	100 a	100 a	100 a	97 a
EPTC + R-25788	3.0 + .25	100	0	97 a	94 a	89 ab	74 ab	100 a	89 a
EPTC + R-25788	4.0 + .375	100	0	96 a	91 a	82 ab	56 b	100 a	97 a
EPTC + R-29148	3.0 + .25	100	0	100 a	88 a	100 a	89 ab	100 a	96 a
EPTC + R-29148	4.0 + .375	100	0	99 a	100 a	85 ab	100 a	97 a	98 a
EPTC (Encap.) + R-25788	3.0 + .25	100	0	93 a	88 a	67 b	71 ab	97 a	91 a
EPTC (Encap.) + R-25788	4.0 + .375	100	0	100 a	100 a	89 ab	100 a	94 a	98 a
EPTC + R-25788 + R-31401	2.0 + .167 + 1.0	100	0	100 a	100 a	100 a	100 a	100 a	100 a
EPTC + R-25788 + R-31401	3.0 + .25 + 1.0	100	0	100 a	100 a	100 a	100 a	100 a	99 a
vernolate + R-25788 + R-31401	2.0 + .167 + 1.0	97	10	100 a	100 a	100 a	100 a	100 a	99 a
vernolate + R-25788 + R-31401	3.0 + .25 + 1.0	100	13	100 a	100 a	100 a	100 a	100 a	99 a
butylate + R-25788 + R-31401	3.0 + .25 + 1.0	100	0	100 a	100 a	100 a	100 a	100 a	99 a
butylate + R-25788 + R-31401	4.0 + .375 + 1.0	100	0	100 a	100 a	100 a	100 a	100 a	100 a

[1] Means with the same letter(s) are not significantly different at the .05 level.

[2] Percent stand of corn compared to the stand in the nontreat check plot.

[3] Percent vigor reduction.

Evaluation of preplant incorporated triazine herbicide combinations for weed control in corn. Lee, G. A., H. P. Alley and A. F. Gale. The screening trial was established at the Torrington Agricultural Substation to compare the effectiveness of preplant incorporated triazine herbicide for annual weed control in corn under furrow irrigation culture. Plots were established on May 7, 1974 and the corn (variety PX-448) was planted on May 10, 1974. All herbicide treatments were incorporated to a depth of 1.5 inches with a flex-tine harrow. Applications were made with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier. Conditions at the time of herbicide applications were: air temperature 73F, soil temperature 56F, relative humidity 20%, wind 5 mph, and skies clear. The soil at the location is classified as a sandy loam (69% sand, 19% silt, 12% clay and 2.1% organic matter). At the time of treatment, the soil was dry on the surface and moist below. No natural precipitation was received for 30 days after herbicide application.

The weed population consisted of black nightshade, redroot pigweed, common lambsquarter, common purslane, kochia and green foxtail. Weed density at the time of evaluation was 25% ground cover in the nontreated check plots. The total weed infestation was comprised of 85% broadleaved species and 15% grass species. Actual counts of each species were made 56 days after treatment to obtain percentage control.

All weed species were eradicated by three of the herbicide combinations. Cyanazine + EPTC + R-25788 at 1.5 + 3.0 + .25 lb/A resulted in 89% and 91% control of common purslane and redroot pigweed, respectively. All other treatments resulted in 92.7% or better control of all species growing in the study area. CGA-24705 + procyazine at 1.5 + 1.2 lb/A, 1.5 + 1.6 lb/A and 2.0 + 1.6 lb/A resulted in moderate vigor reduction of corn. No significant differences in weed control results could be detected between any of the herbicide combination treatments. (Wyoming Agric. Expt. Sta., Laramie, SR-617.)

Effect of preplant incorporated triazine herbicide combinations on corn stand and percentage weed control at Torrington, Wyoming

Treatment	Rate lb/A	Corn S[2]	Corn V[3]	Percentage control: Black nightshade	Redroot pigweed	Common lambsquarter	Purslane	Kochia	Green foxtail
CGA-24705 + atrazine-4L	1.5 + 1.2	100	0	100 a[1]	100 a	100 a	100 a	100 a	97 a
CGA-24705 + atrazine-4L	2.0 + 1.2	97	0	100 a	100 a	100 a	100 a	100 a	98 a
CGA-24705 + procyazine	1.5 + 1.2	100	35	100 a	100 a	100 a	93 a	100 a	98 a
CGA-24705 + procyazine	1.5 + 1.6	90	42	100 a	100 a	100 a	100 a	100 a	100 a
CGA-24705 + procyazine	2.0 + 1.6	93	30	100 a	100 a	100 a	100 a	100 a	99 a
procyazine + atrazine-80W	1.5 + .5	90	0	100 a	100 a	100 a	100 a	100 a	99 a
procyazine + atrazine-80W	2.25 + .75	100	0	100 a	100 a	100 a	100 a	100 a	96 a
cyanazine-4L + EPTC + R-25788	1.5 + 3.0 + .25	100	0	100 a	91 a	100 a	89 a	100 a	97 a
cyanazine-4L + EPTC + R-25788	2.0 + 4.0 + .375	100	0	100 a	100 a	100 a	100 a	100 a	100 a
cyanazine-4L + atrazine-4L	2.0 + 1.0	100	0	100 a	100 a	100 a	100 a	100 a	100 a
cyanazine-4L + alachlor	2.0 + 1.5	100	0	100 a	100 a	100 a	100 a	100 a	99 a
cyanazine-4L + butylate + R-25788	2.0 + 3.0 + .25	100	0	99 a	97 a	100 a	100 a	100 a	100 a

[1] Means with the same letter(s) are not significantly different at the .05 level.
[2] Percent stand of corn compared to the stand in the nontreated check plot.
[3] Percent reduction in corn vigor.

Preemergence weed control in corn under sprinkler irrigation. Lee, G. A., H. P. Alley and A. F. Gale. The experiment was initiated to determine the effect of surface-applied preemergence herbicides on annual weed species and corn tolerance under sprinkler irrigation. The study was conducted at the Torrington Agricultural Substation which has a sandy loam soil type (69% sand, 19% silt, 12% clay and 2.1% organic matter). The corn (variety PX-448) was planted May 7, 1974 and the herbicide treatments were applied on May 8, 1974. Conditions at the time of treatment were: air temperature 68F, soil temperature 54F, relative humidity 25%, wind 5 mph, and skies clear. Herbicides were applied with a knapsack sprayer equipped with a three nozzle boom and calibrated to deliver 40 gpa water carrier. The plot area received a .5 inch sprinkler irrigation within 24 hours after herbicide application.

The weed infestation was comprised of redroot pigweed, common lambsquarter, black nightshade, wild buckwheat and green foxtail. In the non-treated check plots, the weed density was estimated to be 35% ground cover at the time of evaluation. Actual counts of each weed species were made 41 days after herbicide application.

Bifenox at 1.0 and 1.5 lb/A, VEL-5026 at .125, .25 and .5 lb/A, and VEL-5028 at .5 and 1.0 lb/A resulted in severe corn stunting and loss of vigor. VEL-5026 at .25 and .5 lb/A caused substantial corn stand reduction. R-31401 at 2.0 and 4.0 lb/A and atrazine at 1.0 lb/A were the only treatments which eliminated all broadleaved weed species without inducing crop damage. Alachlor at 2.5 lb/A, cyanazine at 2.0 lb/A, procyazine at 2.0 and 2.4 lb/A and R-31401 at 2.0 and 4.0 lb/A resulted in satisfactory control of all weed species present without causing visual damage to the corn crop. (Wyoming Agric. Expt. Sta., Laramie, SR-616.)

Effect of surface-applied preemergence herbicides on corn stand and percentage weed control under sprinkler irrigation at Torrington, Wyoming

			Percentage control				
Treatment	Rate lb/A	% Corn stand	Redroot pigweed	Common lambs-quarter	Black night-shade	Wild buck-wheat	Green foxtail
AC-92553	1.0	93	41 b[1/]	80 a	92 ab	67 a	42 a
AC-92553	1.5	96	30 b	87 a	96 ab	94 a	33 a
atrazine-4L	1.0	98	100 a	100 a	100 a	100 a	89 a
procyazine	1.6	96	95 a	100 a	93 ab	100 a	65 a
procyazine	2.0	96	97 a	100 a	100 a	100 a	98 a
procyazine	2.4	98	91 a	100 a	100 a	100 a	94 a
CGA-24705	2.0	98	97 a	96 a	100 a	67 a	97 a
CGA-24705	2.5	90	92 a	84 a	100 a	94 a	85 a
CGA-24705	3.0	91	100 a	100 a	96 ab	94 a	100 a
R-31401	1.0	92	98 a	100 a	100 a	100 a	83 a
R-31401	2.0	98	100 a	100 a	100 a	100 a	91 a
R-31401	4.0	100	100 a	100 a	100 a	100 a	99 a
bifenox	1.0	100	100 a	86 a	100 a	100 a	42 a
bifenox	1.5	98	100 a	89 a	78 a	100 a	50 a
alachlor	2.5	93	100 a	97 a	92 a	100 a	99 a
VEL-5026	.125	94	100 a	100 a	100 a	100 a	95 a
VEL-5026	.25	75	100 a	100 a	100 a	100 a	98 a
VEL-5026	.50	39	100 a	100 a	100 a	100 a	100 a
VEL-5028	.25	100	94 a	96 a	100 a	94 a	72 a
VEL-5028	.50	90	99 a	100 a	100 a	100 a	96 a
VEL-5028	1.0	88	100 a	100 a	93 ab	100 a	96 a
cyanazine-4L	2.0	94	96 a	100 a	100 a	100 a	92 a

[1/] Means with the same letter(s) are not significantly different at the .05 level.

Herbicide combinations for preemergence weed control in corn under sprinkler irrigation. Lee, G. A., H. P. Alley and A. F. Gale. The experiment was initiated to determine the effect of surface-applied preemergence herbicide combinations on annual weed species and corn tolerance under sprinkler irrigation. The study was conducted at the Torrington Agricultural Substation which has a sandy loam soil type (69% sand, 19% silt, 12% clay and 2.1% organic matter). The corn (variety PX-448) was planted May 7, 1974 and the herbicide treatments were applied on May 8, 1974. Conditions at the time of application were: air temperature 68F, soil temperature 54F, relative humidity 25%, wind 5 mph and skies clear. Herbicide combinations were applied with a knapsack sprayer equipped with a three nozzle boom and calibrated to deliver 40 gpa water carrier. The plot area received a .5 inch sprinkler irrigation within 24 hours after herbicide application.

The weed species present were redroot pigweed, common lambsquarter, black nightshade, wild buckwheat and green foxtail. The weed density was estimated to be 35% ground cover in the nontreated check plots at the time of evaluation. Actual counts of each weed species were made 41 days after herbicide application.

All herbicide combinations resulted in 91.7% or better control of redroot pigweed, common lambsquarter and black nightshade. Bifenox + alachlor at 1.0 + 1.5 lb/A was the only treatment which did not result in 100% control of wild buckwheat. Green foxtail control of 91.7% or better was achieved with five of the herbicide combination treatments. Cyanazine + EPTC + R-25788 at 1.5 + 3.0 + .25 lb/A was the only treatment which gave 100% control of all weed species present. Moderate corn damage was noted in plots treated with bifenox + alachlor at all rates. Slight stunting and malformation of corn plants was detected in plots treated with EPTC (Encapsulated) + R-25788 at 4.0 + .375 lb/A. (Wyoming Agric. Expt. Sta., Laramie, SR-618.)

Effect of surface-applied preemergence herbicide combinations on corn stand and percent weed control under sprinkler irrigation at Torrington, Wyoming

Treatment	Rate lb/A	% Corn stand	Percentage control: Redroot pigweed	Common lambs-quarter	Black night-shade	Wild buck-wheat	Green foxtail
atrazine-4L + AC-92553	.5 + 1.0	94 a[1/]	99 a	100 a	100 a	100 a	60 a
atrazine-4L + AC-92553	1.0 + 1.0	94 a	100 a	96 a	100 a	100 a	85 a
atrazine-4L + CGA-24705	1.2 + 1.5	100 a	100 a	100 a	100 a	100 a	99 a
CGA-24705 + procyazine	1.5 + 1.6	93 a	95 a	100 a	92 a	100 a	92 a
*procyazine + atrazine-80W	2.25 +.75	98 a	100 a	100 a	100 a	100 a	87 a
bifenox + alachlor	1.0 + 1.5	100 a	98 a	100 a	93 a	67 a	70 a
bifenox + alachlor	1.5 + 1.5	98 a	100 a	100 a	96 a	100 a	84 a
alachlor + atrazine-4L	1.5 +1.0	96 a	100 a	100 a	100 a	100 a	99 a
cyanazine-4L + EPTC + R-25788	1.5 + 3.0 + .25	94 a	100 a	100 a	100 a	100 a	100 a
EPTC(Encap.) + R-25788	4.0 + .375	94 a	100 a	96 a	93 a	100 a	98 a

[1/]Means with the same letter(s) are not significantly different at the .05 level.

* Formulated combination. All other treatments were tank-mix combinations.

Sprinkler applied preemergence herbicides for weed control in corn. Lee, G. A. and H. P. Alley. The study was initiated to determine the effectiveness of preemergence herbicides applied through a center pivot sprinkler system for weed control in corn. The irrigation system was calibrated to make one revolution every 42 hours on the 126 acre field or irrigate 3.0 A/hour. The system applied approximately .5 inch of water/A. A piston pump was utilized to inject the herbicide solution into the irrigation system at a point 5 ft from the well head. The auxillary piston pump delivered 1.0 pt of solution per min. The plots were 6.0 A in size which required 2.0 hrs per herbicide treatment to be injected into the system. The soil type at the location is a sandy loam with 67% sand, 25% silt, 8% clay and 2.4% organic matter. The plots were established on May 18, 1974 and the corn (variety TXS-113) was planted on May 11, 1974. Conditions at the time of application were: air temperature 78F, soil temperature 55F, relative humidity 25%, wind 7 mph, and skies clear.

The weed species present were redroot pigweed, Russian thistle, skeletonweed, common lambsquarter, kochia, yellow fieldcress, field sandbur and green foxtail. The plots were evaluated 37 days after initial treatment by counting each weed species in an area 5 ft x 6 inches over the center of the corn row. Percentage weed control was computed by comparing the number of each species in the treated area to the number in the nontreated check plot.

Atrazine + vernolate + R-25788 at 1.0 + 3.0 + 0.25 lb/A resulted in 98.3% or better control of all weed species present which was the best overall performing treatment in the study. No significant difference in control of redroot pigweed, Russian thistle, common lambsquarter, kochia, yellow fieldcress, or green foxtail occurred with the herbicides tested. Propachlor + atrazine at 2.4 + 1.0 lb/A and atrazine at 1.2 lb/A resulted in significantly less control of skeletonweed than the three other treatments. Although no herbicide treatment resulted in less than 94.0% control of field sandbur, atrazine at 1.2 lb/A and atrazine + butylate + R-25788 at 1.0 + 3.0 + 0.25 lb/A resulted in significantly less control compared to the other treatments. No phytotoxic symptoms were apparent nor was the corn stand reduced as a result of the herbicide applications. (Wyoming Agric. Expt. Sta., Laramie, SR-614.)

Effect of preemergence herbicides applied through center pivot sprinkler system on corn stand and weed species at Lagrange, Wyoming

Treatment	Rate lb/A	% Corn stand	Percentage control: Redroot pigweed	Russian thistle	Skeleton weed	Common lambs-quarter	Kochia	Yellow field-cress	Field sandbur	Green foxtail
propachlor + atrazine-80W	2.4 1.0	100 a[1/]	100 a	98 a	58 c	100 a	100 a	100 a	97 ab	100 a
atrazine-4L	1.2	100 a	100 a	100 a	90 b	100 a	100 a	100 a	95 b	100 a
atrazine-4L + vernolate-6EC + R-25788	1.0 3.0 0.25	100 a	100 a	100 a	98 a	100 a	100 a	100 a	98 a	100 a
atrazine-4L + alachlor 4EC	1.0 2.0	100 a	100 a	100 a	95 ab	100 a	100 a	100 a	99 a	100 a
atrazine-4L + butylate-6EC + R-25788	1.0 3.0 0.25	100 a	100 a	100 a	96 ab	100 a	100 a	100 a	94 b	100 a

[1/]Means with the same letter(s) are not significantly different at the .05 level.

Preemergence weed control in corn under center-pivot sprinkler irrigation. Lee, G. A., A. F. Gale and H. P. Alley. The study was established at LaGrange, Wyoming where center-pivot sprinklers are utilized extensively for crop irrigation. Herbicide treatments were surface applied on May 16, 1974 and the corn (variety TXS-113) was planted on May 11, 1974. Conditions at the time of herbicide applications were air temperature 70F, soil temperature 54F, relative humidity 35%, wind 5 mph, clear skies. The soil at the location is a sandy loam with 67% sand, 25% silt, 8% clay and 2.4% organic matter. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa of water carrier. The treatments were applied approximately 2 hours prior to irrigation with the sprinkler system.

The weed population consisted of redroot pigweed, Russian thistle, skeletonweed, common lambsquarter, kochia, yellow fieldcress, field sandbur and green foxtail. The weed density in the nontreated check plots at the time of evaluation was approximately 20% ground cover. Actual counts of each weed species were obtained in an area 5 ft by 6 inches at two locations within each plot. Percentage weed control was computed by comparing number of each species in the treated plot to the number in the nontreated check plots.

Cyprazine at 1.0, 2.0 and 3.0 lb/A resulted in complete elimination of all weed species present. Corn growing in plots treated with cyprazine at 3.0 lb/A was stunted, chlorotic and the stand was reduced significantly. Ethiolate at 1.0, 1.5 and 2.0 lb/A resulted in 100% control of all weed species with no visual phytotoxic effect on the corn plants. Atrazine-4L at 1.2 lb/A eliminated all weed species present except skeletonweed. (Wyoming Agric. Expt. Sta., Laramie, SR-621.)

Effect of preemergence herbicides on corn stand and weed species at Lagrange, Wyoming

Treatment	Rate lb/A	% Corn stand	Percentage control: Redroot pigweed	Russian thistle	Skeleton weed	Common lambs-quarter	Kochia	Yellow field-cress	Field sandbur	Green foxtail
cyprazine	1.0	100 a[1/]	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
cyprazine	2.0	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
cyprazine	3.0	78 b	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
ethiolate	1.0	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
ethiolate	1.5	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
ethiolate	2.0	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a
atrazine 4L	1.2	100 a	100 a	100 a	87 b	100 a	100 a	100 a	100 a	100 a

[1/] Means with the same letter(s) are not significantly different at the .05 level.

DSMA and MSMA applied over-the-top of cotton. Hamilton, K. C. and H. F. Arle. Study of the effects of single and repeat, over-the-top applications of DSMA and MSMA in cotton was continued at the Cotton Research Center, Phoenix, Arizona in 1973. Cotton (var. Deltapine 16) was planted in moist soil under a dry mulch in April. Bensulide was applied preplanting, diuron was applied directed postemergence, and all plots were cultivated four times to control annual weeds. DSMA and MSMA were applied over-the-top of cotton on May 23, June 20, and (or) July 18 when untreated cotton was 5, 16, and 24 inches tall. DSMA and MSMA were applied in 40 gpa of water containing 0.5% of a blended surfactant. Treatments were replicated four times on 4-row plots 41 feet long. Treated cotton was observed each week. Before harvest, 10-boll samples were taken from each plot for analyses of boll components and fiber properties. The center rows of each plot were machine-picked in November.

All applications of DSMA and MSMA caused temporary discoloration of cotton leaves, petioles, and stems and stunted cotton plants. Treatments that included a July application of DSMA or MSMA delayed maturity and reduced cotton yields. Any treatment that had two applications reduced yields. A single application of DSMA in May or June did not significantly reduce yields. July applications of DSMA and MSMA affected boll weight, percent lint, and fiber fineness. (Cooperative investigations of Arizona Agr. Exp. Sta., Tucson, and Agricultural Research Service, U. S. Department of Agriculture, Phoenix.)

Yield of cotton treated with over-the-top applications of DSMA and MSMA at Phoenix, Arizona in 1973

Dates of application 2 lb/A at each date	Yield of seed cotton in lb/A[1/] treated with: DSMA	MSMA
Untreated check	3,960 a	3,760 a
5/23	3,640 ab	3,590 ab
5/23, 6/20	3,270 bcd	3,250 bc
5/23, 6/20, 7/18	3,000 cd	2,290 f
6/20	3,640 ab	3,470 bc
6/20, 7/18	2,800 d	2,440 ef
7/18	3,390 bc	2,760 d
5/23 7/18	3,390 bc	2,680 de

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

Herbicide combinations applied over-the-top of cotton. Arle, H. F. and K. C. Hamilton. Study of the effects of one or two over-the-top applications of herbicide combinations on cotton were continued in 1973 at the Cotton Research Center, Phoenix, Arizona. Cotton (var. Deltapine 16) was planted in moist soil under a dry mulch in April. Bensulide was applied preplanting and diuron was applied directed post-emergence to all plots which were also cultivated four times to control annual weeds. DSMA at 2 lb/A and diuron, prometryn, and fluometuron at 0.5 lb/A (alone and in combination with DSMA at 2 lb/A) were applied over-the-top of cotton on May 23 and June 6 when untreated cotton was 5 and 10 inches tall. Herbicides were applied in 40 gpa of water containing 0.5% of a blended surfactant. Treatments were replicated four times on 4-row plots 41 feet long. Plots were observed each week to evaluate the effects of treatments. Before harvest, 10-boll samples were taken from each plot for boll component and fiber property analyses. The center rows of each plot were machine-picked in November.

Over-the-top applications of DSMA caused temporary discoloration of cotton stems and foliage. Prometryn and diuron caused chlorosis of cotton foliage and stunting of cotton plants. Fluometuron did not appear to affect the growth of cotton. A single application of any herbicide over-the-top of cotton did not affect yield (see table). Two applications containing DSMA, diuron, prometryn, or combinations of DSMA and diuron or prometryn reduced yields. Boll weight, percent lint, seed per boll, fiber strength, fiber length, and fiber fineness were not affected by two applications of herbicides. (Cooperative investigations of Agricultural Research Service, U.S.D.A., Phoenix, and Arizona Agr. Exp. Sta., Tucson.)

Yield of cotton treated with one or two over-the-top applications of herbicide combinations at Phoenix, Arizona in 1973

Treatments				Yield of seed cotton in lb/A[1/] treated:	
Herbicide	rate (lb/A)	Herbicide	rate (lb/A)	5/23	5/23 & 6/6
Untreated				3,960 a	4,060 a
		DSMA	2	3,700 a	3,450 bcd
diuron	.5			3,350 a	3,470 bcd
prometryne	.5			3,410 a	3,370 cd
fluometuron	.5			3,700 a	3,960 ab
diuron	.5	DSMA	2	3,250 a	3,350 cd
prometryn	.5	DSMA	2	3,370 a	3,270 d
fluometuron	.5	DSMA	2	3,610 a	3,820 abc

[1/] In a column, values followed by the same letter do not differ significantly at the 5% level of probability.

Height of postemergence applications of herbicides in cotton. Arle, H. F. and K. C. Hamilton. Study of the effects of directed postemergence applications of herbicides in cotton were continued during 1973 at the Cotton Research Center, Phoenix, Arizona. Trifluralin (0.5 lb/A) was applied to the soil in March and disked in before furrowing for the preplanting irrigation to reduce populations of annual weeds. Cotton (var. Deltapine 16) was planted in moist soil under a dry mulch in April. All plots were cultivated four times and weed-free checks were hoed as needed to control weeds. Postemergence herbicides were applied on June 28 (cotton 17 inches tall) as directed sprays covering the furrow and (1) only the base or (2) the lower half of cotton plants. Herbicides were applied in 40 gpa of water containing 0.5% of a blended surfactant. Treatments were replicated four times on 4-row plots 41 feet long. Weeds present included browntop panicum, junglerice, barnyardgrass, Wright groundcherry, and Palmer amaranth. Weed control was estimated on each plot after cotton was defoliated and the center rows of each plot were machine-picked in November.

Applications of herbicides to the lower half of cotton plants caused chlorosis or burning of treated cotton foliage. This was most severe with linuron and prometryn. Late-season growth of cotton appeared normal with all treatments. All herbicide treatments controlled weeds. There was no significant difference in yield due to herbicide treatments, but in 1972 and 1973 cotton having herbicides applied to the lower half of plants tended to yield less than cotton where herbicides were applied only to the base of plants. (Cooperative investigations of Agricultural Research Service, U. S. Department of Agriculture, Phoenix, and Arizona Agr. Exp. Sta., Tucson.)

Weed control and cotton yield after postemergence applications of herbicides directed to base and lower half of cotton plants at Phoenix, Arizona, in 1973

Postemergence treatment			Weed control percent estimated 10/17/73		Yield of seed cotton[1/]
Herbicide	Rate (lb/A)	Directed to:	Broadleaf	Grass	(lb/A)
cultivated and hoed			100	100	3,590 a
linuron	1	base	100	100	3,700 a
linuron	1	lower half	99	99	3,490 a
diuron	1	base	100	100	3,570 a
diuron	1	lower half	100	100	3,470 a
prometryn	1	base	100	100	3,570 a
prometryn	1	lower half	100	100	3,470 a

[1/] Values followed by the same letter are not significantly different at the 5% level of probability.

Cotton yields following preplant and preemergence herbicide treatments. Anderson, W. P. and M. Clary. Herbicide treatments were applied preplant and preemergence to furrow-irrigated cotton (Upland cotton, Strain 4111) on March 29 and April 28, 1974, respectively, to determine their effect on cotton yields. Preplant treatments were soil incorporated two inches deep by double-discing parallel to the crop rows. Soil type was clay loam (Saneli-like). Cotton was harvested November 15, 1974, by machine-picker. Weeds, other than annual morningglory, were scarce and not a problem, even in the untreated control plots, for most of the season. Annual morningglory was controlled by one cultivation and two hand-hoeings, in addition to control provided by the herbicide treatments. The respective herbicides and mixtures of herbicides (principally dinitroanilines and diamino-*s*-triazines) applied are shown in the table.

Yield data for the respective herbicide treatments are shown in the table. The data represent the average of five replications for each treatment. The machine-picker made one pass through each plot, harvesting the center-row of three-row plots 40 feet long. The results show that no treatment reduced cotton yields below that of weed-free, untreated controls and that yields from most herbicide-treated plots were much better than from the controls. (Agr. Expt. Sta., New Mexico State University, Las Cruces.)

Cotton yields from herbicide-treated plots; crop season - 1974

Treatment		Yield of cotton lint[a/]	
Herbicides	lbs/A	lbs/A	bales/A
Preplant, soil incorporated			
profluralin	0.75	1312	2.6
	1.00	1186	2.4
	1.50	1427	2.9
prometryne	1.60	1424	2.9
	2.00	1357	2.7
	2.40	1526	3.1
dipropetryn	2.25	1465	2.9
fluometuron	2.25	1249	2.5
trifluralin	0.75	1396	2.8
profluralin + prometryne (Company mix)	0.75 + 2.00	1576	3.2
profluralin + prometryne (tank mix)	0.75 + 2.00	1581	3.2
	0.75 + 2.25	1225	2.5
	0.80 + 2.40	1400	2.8
	1.00 + 2.00	1469	2.9
profluralin + dipropetryn	0.75 + 2.25	1355	2.7
trifluralin + prometryne	0.75 + 2.25	1442	2.9
Preplant plus preemergence			
profluralin (preplant) plus prometryne (preemergence)	0.75 + 1.60	1422	2.8
	1.00 + 1.60	1393	2.8
trifluralin (preplant) plus prometryne (preemergence)	0.75 + 1.60	1436	2.9
	0.75 + 2.00	1469	2.9
Preemergence			
prometryne	1.60	1287	2.6
Untreated control (weed-free)	0	1228	2.5

[a/] Average of five replications.

Annual morningglory control with dinitroaniline herbicides. Anderson, W. P. and M. Clary. Field observations have indicated that dinitroaniline herbicides may provide some control of annual morningglory in croplands. During an experiment with these herbicides in cotton, a dense volunteer stand of annual morningglory covered the experimental area. This opportunity to observe the comparative control of this weed by dinitroaniline herbicides was exploited by making stand-counts of the annual morningglory plants present in each treatment.

Annual morningglory and cotton seedlings emerged together and stand-counts of this weed were made June 17, 1974, following preplant and preplant plus preemergence herbicide-treatments applied March 29 and April 28, 1974, respectively. The soil type was a clay loam (Saneli-like). The dinitroaniline herbicides were applied preplant, soil incorporated, and in addition, six of the eight dinitroanilines were applied preplant and another herbicide (prometryne or dipropetryn) was applied as a preemergence treatment to these respective plots. Refer to table for the herbicides and dosages applied.

Plant-counts of annual morningglory were made on the center-bed of three-bed plots 40 feet long and in the furrows on each side of this bed. In general, the number of annual morningglory plants in the furrows gives an indication of the natural population of annual morningglory plants in the immediate vicinity of the respective plots, as the tool opening the furrows tended to throw much of the treated soil onto the bed tops and exposing untreated soil in the furrows. However, some herbicide-treatments tended to provide control of this weed even in the furrows. Species of annual morningglory present in the experimental area included scarlet morningglory, tall morningglory, and woolly morningglory.

Furrows were made after all treatments had been applied and the cotton and annual morningglory seedlings had emerged. The first irrigation was made May 21, 1974. Annual morningglory was essentially the only weed present at the time the counts were made, and the plant-count of this weed on the plant-beds, compared with the plants in the furrows and in the untreated control plots, is indicative of the degree of control obtained with each respective treatment.

The plant counts (average of three replications) obtained for each treatment are shown in the table. Plant-counts per replication greater than one hundred were noted as 100+ and, when averaged, the (+) added after the numerical average; some plots had 150 to as many as 300 annual morningglory plants.

The results show that the dinitroaniline herbicides, applied preplant, do provide some control of annual morningglory. However, it must be borne in mind that only one annual morningglory plant per 40-foot of crop-row is too many. However, in most cases, the degree of control obtained did greatly aid in the task of removing surviving annual morningglory plants by cultivation and hand-hoeing. (Agr. Expt. Sta., New Mexico State University, Las Cruces.)

Annual morningglory control with dinitroaniline herbicides applied alone and in combination with prometryne or dipropytryn; summer - 1974

Treatment: Herbicide	lbs/A	Number of morningglory plants[a]: crop bed	furrows
Preplant, soil incorporated			
AC-92340	0.50	7	47
	0.75	2	18
	1.00	35+	55+
dibutalin	1.50	50+	60+
	2.00	5	60+
	3.00	2	10
dinitramine	0.25	7	40
	0.33	23	60+
	0.50	1	8
	0.66	10	33
fluchloralin	0.50	35+	80+
	0.75	20+	100+
	1.00	30+	70+
nitralin	0.50	15	80+
	0.75	35+	70+
	1.00	4	80+
oryzalin	0.33	17	100+
	0.50	6	40+
	0.66	11	30+
	0.75	6	15
profluralin	0.75	25	78
	1.00	37	100+
	1.50	62	100+
trifluralin	0.50	2	50
	0.75	2	35

Treatment: Herbicide	lbs/A	Number of morningglory plants[a]: crop bed	furrows
Preplant plus preemergence			
AC-92340 (preplant) plus prometryne (preemergence)	0.75 + 1.6	7	55+
dibutalin (preplant) plus prometryne (preemergence)	2.00 + 1.6	1	24
dinitramine (preplant) plus prometryne (preemergence)	0.25 + 1.6	18	33
	0.33 + 1.6	20	65+
	0.50 + 1.6	1	25
	0.75 + 1.6	0	12
nitralin (preplant) plus prometryne (preemergence)	0.50 + 1.6	4	43
	0.75 + 1.6	5	66
profluralin (preplant) plus prometryne (preemergence)	0.75 + 1.6	68+	100+
	1.00 + 1.6	11	36
trifluralin (preplant) plus prometryne (preemergence)	0.50 + 1.6	3	90+
dinitramine (preplant) plus dipropetryn (preemergence)	0.33 + 2.0	12	84
	0.66 + 2.0	1	5
Preemergence			
dipropytryn	2.0	7	30+
prometryne	1.6	35+	46+
Untreated control	0	100+	100+

[a] Average of three replications; plant counts made on the top of the center-bed of three-bed plots 40 feet long and in the two furrows on each side of the center bed. The (+) sign denotes that at least one replication contained more than 100 morningglory plants.

Comparison of dinitroaniline herbicide treatments on cotton yields. Anderson, W. P. and M. Clary. Seven dinitroaniline herbicides were applied preplant, soil incorporated, and in addition, five of these herbicides were applied preplant and a second herbicide (prometryne, dipropetryn, or diuron) was applied preemergence to these respective plots. The crop was furrow-irrigated Upland cotton (strain 4111). Preplant and preemergence treatments were applied March 29 and April 28, 1974, respectively. Preplant treatments were soil incorporated two inches deep by double-discing parallel to the crop rows. The soil type was clay loam (Saneli-like). The objective of the experiment was to compare the effect of herbicide treatments on cotton yields. Weeds were not a problem in the experimental area, other than annual morningglory. The area was cultivated once and hand-hoed twice to control annual morningglory plants.

The cotton was machine-harvested November 15, 1974, with the picker passing once through each plot, harvesting the center-row of three-row plots 40 feet long. Yield data for the respective herbicide treatments are shown in the table, and the data represent the average of three replications for each treatment. No treatment reduced cotton yields below that of the weed-free untreated controls and most yields from herbicide-treated plots were much better than from the controls. (Agr. Expt. Sta., New Mexico State University, Las Cruces.)

Cotton yields obtained following preplant and preplant plus preemergence herbicide treatments (1974)

Treatment		Yield of cotton lint[a]	
Herbicide	lbs/A	lbs/A	bales/A
Preplant, soil incorporated			
AC-92340	0.50	1377	2.7
	0.75	1165	2.3
	1.00	1241	2.5
	1.50	1456	2.9
dibutalin	1.50	1320	2.6
	2.00	1408	2.8
	3.00	1247	2.5
dinitramine	0.25	1327	2.6
	0.33	1227	2.4
	0.50	1285	2.6
fluchloralin	0.50	1231	2.5
	0.75	1373	2.7
	1.00	1323	2.6
oryzalin	0.33	1353	2.7
	0.50	1543	3.0
	0.66	1301	2.6
	0.75	747	1.5
nitralin	0.50	1396	2.8
	0.75	1372	2.7
	1.00	1114	2.2
trifluralin	0.50	1481	3.0
	0.75	1314	2.6

Treatment		Yield of cotton lint[a]	
Herbicide	lbs/A	lbs/A	bales/A
Preplant plus preemergence			
AC-92340 (preplant) plus prometryne (preemergence)	0.75 + 1.6	1541	3.1
dibutalin (preplant) plus prometryne (preemergence)	2.00 + 1.6	1392	2.8
dinitramine (preplant) plus prometryne (preemergence)	0.25 + 1.6	1156	2.3
	0.33 + 1.6	1334	2.7
	0.50 + 1.6	1275	2.5
	0.66 + 1.6	1234	2.5
dinitramine (preplant) plus dipropetryn (preemergence)	0.33 + 2.0	1367	2.7
	0.66 + 2.0	1291	2.6
nitralin (preplant) plus prometryne (preemergence)	0.50 + 1.6	1404	2.8
	0.75 + 1.6	1223	2.4
trifluralin (preplant) plus prometryne (preemergence)	0.50 + 1.6	1301	2.6
trifluralin (preplant) plus diuron (preemergence)	0.50 + 1.25	1485	3.0
Untreated control (weed-free)	0	1027	2.1

[a] Average of three replications.

Evaluation of preplant incorporated herbicides for weed control in field beans. Lee, G. A., H. P. Alley and A. F. Gale. The study was conducted at the Torrington Agricultural Substation to evaluate preplant incorporated herbicides for annual weed control in field beans grown under furrow irrigation culture. The herbicide treatments were applied on May 15, 1974 and the field beans (variety Pinto UI-111) were planted May 17, 1974. The herbicides were incorporated to a depth of 1.5 inches with a flex-tine harrow. Plots were 1 sq rd in size and each treatment was replicated three times. The soil at the location is classified as a sandy loam (69% sand, 19% silt, 12% clay, 2.1% organic matter and 7.5 pH). Conditions at the time of herbicide application were: air temperature 60F, soil temperature 63F, relative humidity 45%, wind 3 mph and skies clear. The soil was dry on the surface and moist at a depth of 2.5 inches. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier.

The weed population consisted of black nightshade, redroot pigweed, common lambsquarter, common purslane and green foxtail. The weed density in the nontreated check plots, at the time of evaluation, was 60% ground cover comprised of 67% broadleaved weed species and 33% grass weed species. Actual counts of each species were made 47 days after herbicide application to determine percentage control.

There were 10 preplant herbicide treatments which gave 96.1% or better control of the total weed spectrum. Black nightshade control of 90.6% or better was obtained with 16 treatments. All treatments were effective for redroot pigweed control. MC-8475 at .75 lb/A, H-22234 at 2.0 lb/A and NC-8438 at 2.0 lb/A resulted in less than 90% control of common lambsquarter. All treatments gave 91.7% or better control of common purslane and green foxtail. MC-8479 at 1.5 lb/A and H-26905 at 4.0 lb/A resulted in moderate bean vigor reduction; however, yields from plots treated with these herbicides produced 114 to 177 pounds of beans per acre more than the nontreated check plot. Yields from plots treated with five of the herbicides produced from 2003 to 2242 pounds of beans per acre compared to 1220 pounds of beans produced in the nontreated check plot. (Wyoming Agr. Expt. Sta., Laramie, SR-619.)

Effect of preplant incorporated herbicides on percentage weed control and field bean stands and yield at Torrington, Wyoming

Treatment	Rate lb/A	Bean S[1]	Bean V[2]	Percentage control: Black nightshade	Redroot pigweed	Common lambsquarter	Common purslane	Green foxtail	Yield lb/A
fluchloralin	.75	96	0	92.1	100.0	99.3	97.4	100.0	1652
fluchloralin	1.5	100	0	98.9	100.0	100.0	100.0	100.0	1655
profluralin	.75	94	0	84.5	100.0	99.3	100.0	100.0	1652
profluralin	1.0	100	0	90.9	100.0	99.3	100.0	99.1	2083
AC-92553	1.0	95	0	97.8	100.0	99.3	100.0	100.0	1846
AC-92553	1.5	91	0	93.9	100.0	100.0	100.0	100.0	2003
nitralin	.75	100	0	90.6	100.0	100.0	100.0	100.0	1612
EPTC (6E)	3.0	87	0	100.0	98.0	96.1	100.0	99.8	1643
EPTC (Encap.)	3.0	98	0	100.0	100.0	100.0	100.0	100.0	1803
MC-8475	.75	91	0	56.3	96.7	86.3	91.7	94.9	1455
MC-8475	1.5	93	0	84.6	100.0	100.0	100.0	99.4	1561
MC-8479	.75	98	0	81.0	97.5	91.6	100.0	93.0	1776
MC-8479	1.5	82	25	83.8	100.0	100.0	100.0	99.4	1397
H-26905	2.0	88	10	100.0	100.0	99.3	100.0	99.8	1759
H-26905	4.0	53	30	99.1	100.0	96.1	100.0	100.0	1334
A-820	1.0	99	0	94.0	98.0	93.1	100.0	98.3	1530
A-820	1.5	98	0	97.8	100.0	100.0	100.0	99.4	2090
H-22234	2.0	96	0	88.9	96.7	88.8	91.7	100.0	1718
H-22234	3.0	98	0	97.5	95.0	92.2	100.0	100.0	1966
dinitramine	.5	100	0	100.0	100.0	100.0	100.0	100.0	1875
dinitramine	.66	93	0	100.0	100.0	100.0	100.0	99.1	2086
alachlor	2.5	98	0	98.9	100.0	98.1	100.0	100.0	2242
NC-8438	2.5	92	0	79.3	90.6	70.2	100.0	98.6	1909
check		100	0	0	0	0	0	0	1220

1/ Percent field bean stand.
2/ Percent vigor reduction.

Evaluation of preplant incorporated herbicide combinations for weed control in field beans. Lee, G. A., H. P. Alley, and A. F. Gale. The experiment was initiated at the Torrington Agricultural Substation to evaluate preplant incorporated herbicide combinations for annual weed control in field beans grown under furrow irrigation culture. The herbicides were applied on May 15, 1974 and the field beans (variety Pinto UI-111) were planted May 17, 1974. The herbicides were incorporated to a depth of 1.5 inches with a flex-tine harrow. Plots were 1 sq rd in size and each treatment was replicated three times. The soil at the location is classified as a sandy loam (69% sand, 19% silt, 12% clay, 2.1% organic matter and 7.5 pH). Conditions at the time of herbicide application were: air temperature 60F, soil temperature 63F, relative humidity 45%, wind 3 mph and skies clear. The soil was dry on the surface and moist at a depth of 2.5 inches. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier.

Black nightshade, redroot pigweed, common lambsquarter, common purslane and green foxtail infested the study area. The weed density in the nontreated check plots, at the time of evaluation, was 60% ground cover. The total population was comprised of 67% broadleaved weeds and 33% grass weeds. Actual counts of each species were made 47 days after the herbicide combinations were applied. Percentage control was obtained by comparing the number of each species in the treated plots to the number of each species in the nontreated check plots.

The total weed spectrum was eliminated by seven of the 19 herbicide combinations evaluated. All herbicide combinations resulted in 95.6% or better control of all weed species present. At harvest time, some minimal weed reinfestation was occurring in plots treated with trifluralin + EPTC at .5 + 1.5 lb/A. Black nightshade was the major species reinvading the area but the plants were immature and not producing fruits which would result in reduced quality of the bean crop. MC-8475 and MC-8479 with bifenox applied as a preemergence surface split application resulted in severe bean stand and vigor reduction. Fluorodifen at 3.0 lb/A applied preemergence over EPTC and trifluralin, respectively, resulted in substantial bean stand reduction. The herbicides applied exclusively as preplant incorporated treatments resulted in slight to no bean vigor reduction. Bean yields from plots treated with herbicide combinations were 175 to 867 pounds higher than the nontreated check plot except plot treated with MC-8475 and MC-8479 and overlayed with bifenox. The nontreated check plot was hand hoed 45 days after the beans were planted and was kept weed free during the remainder of the growing season. (Wyoming Agric. Expt. Sta., Laramie, SR-622.)

Effect of preplant incorporated herbicide combinations on percentage weed control, and field bean stand and yield at Torrington, Wyoming

Treatment	Rate lb/A	Bean S[1]	Bean V[2]	Percentage control: Black night-shade	Redroot pigweed	Common lambs-quarter	Common purslane	Green foxtail	Yield lb/A
profluralin + EPTC	.5 + 2.0	98	8	100.0	100.0	100.0	100.0	100.0	1745
trifluralin + EPTC	.5 + 2.0	100	0	100.0	100.0	100.0	100.0	100.0	2059
trifluralin + EPTC	.5 + 1.5	99	0	100.0	100.0	100.0	100.0	99.4	1701
AC-92553 + EPTC	1.0 + 2.0	100	10	100.0	100.0	100.0	100.0	100.0	1642
nitralin + EPTC	.75 + 2.0	100	0	98.9	100.0	100.0	100.0	100.0	1841
MC-8475 + *bifenox	1.5 + 1.5	13	40	95.6	100.0	95.8	100.0	99.2	754
MC-8479 + *bifenox	1.5 + 1.5	11	45	97.3	100.0	98.8	100.0	100.0	602
A-820 + EPTC	1.0 + 2.0	98	0	100.0	100.0	100.0	100.0	100.0	1628
A-820 + EPTC	.75 + 2.0	98	0	97.3	97.5	98.6	100.0	100.0	1974
EPTC + *fluorodifen	2.0 + 2.0	88	14	100.0	100.0	100.0	100.0	100.0	1499
EPTC + *fluorodifen	2.0 + 3.0	78	12	100.0	100.0	97.2	100.0	99.8	1772
trifluralin + *fluorodifen	.5 + 2.0	88	0	99.1	100.0	100.0	100.0	100.0	1981
trifluralin + *fluorodifen	.5 + 3.0	78	8	98.2	100.0	100.0	100.0	100.0	1845
H-22234 + EPTC	2.0 + 2.0	100	0	97.3	100.0	100.0	100.0	100.0	2089
dinitramine + EPTC	.33 + 1.5	98	0	100.0	100.0	100.0	100.0	100.0	1956
dinitramine + EPTC	.5 + 2.0	99	0	100.0	100.0	100.0	100.0	100.0	1855
dinitramine + alachlor	.33 + 1.5	91	0	97.8	100.0	100.0	100.0	99.4	1945
dinitramine + alachlor	.5 + 2.0	89	0	100.0	100.0	100.0	98.3	100.0	1992
NC-8438 + EPTC	2.0 + 1.5	82	15	97.8	100.0	100.0	100.0	100.0	1395
check	-	100	0	-	-	-	-	-	1220

[1]Percent field bean stand.

[2]Percent vigor reduction.

* Herbicides applied as preemergence surface application over preplant treatments.

Preemergence weed control in field beans under sprinkler irrigation. Lee, G. A., H. P. Alley and A. F. Gale. The study was initiated to evaluate the weed control potential of surface-applied preemergence herbicides under sprinkler irrigation in Wyoming. Plots were established at the Torrington Agricultural Substation on May 15, 1974 and the Pinto beans (variety - UI 111) were planted May 14, 1974. The soil type is a sandy loam consisting of 71% sand, 19% silt, 10% clay, and 1.3% organic matter. Conditions at the time of herbicide application were: air temperature 75F, soil temperature 61F, relative humidity 30%, wind 3 mph, and skies clear. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa of water carrier. The plot area received a .5 inch irrigation within one hour after herbicides were applied.

The weed infestation was comprised of redroot pigweed, common lambsquarter, black nightshade, wild buckwheat and green foxtail. At the time of evaluation, the weed density in the nontreated check plots was 55% ground cover. Actual weed counts were made 34 days after initial herbicide application. The number of each species in the treated plots was compared to the number in the nontreated check plot.

Annual weed species were eliminated by four of the 18 herbicide treatments. There were three additional treatments which gave 95% or better control of the broadleaved weed spectrum. Green foxtail control of 91% or better was obtained with 12 of the herbicide treatments. EPTC (Encapsulated) at 3.0 and 4.0 lb/A, bifenox + alachlor at 1.0 + 1.5 lb/A and bifenox at 1.5 lb/A resulted in a significant reduction in the bean stand. There was a moderate infestation of root rot organisms present in the study area which may have confounded the herbicide effect on the bean stand and subsequent yield. Areas treated with EPTC (Encapsulated) at 3.0 and 4.0 lb/A produced lower bean yields than the nontreated check area. (Wyoming Agric. Expt. Sta., Laramie, SR-615.)

Effect of preemergence herbicides on field bean stand, weed control and bean yield under sprinkler irrigation at Torrington, Wyoming

			Percentage control					
Treatment	Rate lb/A	% Bean stand	Redroot pigweed	Common lambs-quarter	Black night-shade	Wild buck-wheat	Green foxtail	Yield lb/A
CGA-24705	2.0	97.0a[1]	83.3ab	57.0ab	93.3a	100.0a	92.3a	1084.5
CGA-24705	2.5	81.0ab	100.0a	89.0a	97.3a	100.0a	99.0a	1463.4
CGA-17020	.75	94.0a	93.3a	81.3a	97.3a	100.0a	91.0a	1412.8
CGA-17020	1.5	86.0ab	100.0a	100.0a	100.0a	100.0a	99.7a	1329.0
EPTC (Encap.)	3.0	71.0b	92.0ab	91.7a	93.3a	66.7ab	98.0a	892.4
EPTC (Encap.)	4.0	65.0b	61.3ab	61.0ab	93.3a	66.7ab	66.3ab	918.6
EPTC (E6)	3.0	99.0a	96.0a	95.3a	97.3a	100.0a	95.0a	1105.4
bifenox + alachlor	1.0 + 1.5	74.0b	100.0a	100.0a	100.0a	100.0a	99.3a	1132.9
bifenox + alachlor	1.5 + 1.5	83.0ab	100.0a	95.3a	97.3a	100.0a	92.7a	1241.6
bifenox	1.5	73.0b	100.0a	100.0a	100.0a	100.0a	86.0a	1409.3
H-26905	2.0	94.0a	33.3bc	30.7ab	74.0b	33.3ab	47.3ab	1444.2
H-26905	4.0	97.0a	98.0a	100.0a	100.0a	100.0a	77.0a	1255.6
fluorodifen	4.5	86.0ab	100.0a	100.0a	100.0a	100.0a	92.3a	1545.5
fluorodifen + alachlor	3.5 + 1.5	86.0ab	89.7ab	54.0ab	89.0a	66.7ab	69.3ab	1093.2
fluorodifen + alachlor	3.0 + 2.0	90.0a	100.0a	77.7ab	100.0a	100.0a	97.3a	1222.4
NC-8438	2.5	96.0a	100.0a	77.7ab	97.3a	100.0a	66.3ab	1418.0
NC-8438 + EPTC	2.0 + 1.5	82.0ab	94.0a	100.0a	100.0a	100.0a	95.0a	1241.6
alachlor	2.5	85.0ab	100.0a	100.0a	93.3a	100.0a	99.7a	1280.0
check		100.0a	0.0c	0.0b	0.0c	0.0b	0.0b	1014.6

[1] Means with the same letter(s) are significantly different at the .05 level.

Chemical fallow with single herbicide application in Wyoming. Lee, G. A. and H. P. Alley. The study was initiated at the Archer Agricultural Substation to determine the effectiveness of single herbicides for weed control in a wheat fallow system. The treatments were made on April 23, 1974 when the air temperature was 65F, soil temperature 45F, relative humidity 60%, wind calm and clear skies. The sandy loam soil (60% sand, 24% silt, 16% clay and 1.0% organic matter) contained adequate moisture at the time of herbicide applications. Rainfall in the amount of .2 inch occurred within 72 hours after initial treatments; however, .6 inch of precipitation was received during the ensuing 60 days. The herbicides 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 tansy mustard, Russian thistle, redroot pigweed, downy brome and volunteer wheat. The infestation of downy brome comprised approximately 80% of the weed spectrum. Weed control was determined by visual evaluation 72 days after initial treatment.

Broadleaved weed control of 90% or better was achieved with 14 of the 18 single herbicide applications (table). Cyanazine 80W and 4L formulations at 2.4 lb/A and karbutilate at .75, 1.0 and 2.0 lb/A eliminated all broadleaved weed species. All herbicide treatments effectively controlled redroot pigweed. The wettable powder and flowable formulations of cyanazine at comparable rates resulted in similar control of the broadleaved weed species. The flowable formula did, however, give significantly better control of downy brome. Glyphosate at .5 lb/A applied in 20 gpa water carrier was the only treatment which resulted in complete elimination of downy brome and volunteer wheat. There were four treatments which resulted in 90.7% or better control of downy brome. No single herbicide treatment other than glyphosate gave satisfactory control of volunteer wheat.

No data regarding residual effect on the subsequent wheat crop has been obtained. This may be a factor, however, in the potential usefulness of these compounds in semi-arid regions of the western United States. (Wyoming Agric. Expt. Sta., Laramie, SR-611.)

Effect of herbicides on annual broadleaved and grassy weed species in a wheat fallow system at Archer Agricultural Substation, Cheyenne, Wyoming

		Percentage control				
Treatment	Rate lb/A	Tansy mustard	Russian thistle	Redroot pigweed	Downy brome	Volunteer wheat
cyanazine 80W	.75	90.7cd[1/]	87.3c	100.0a	40.0kl	0.0g
cyanazine 80W	1.2	95.0ac	100.0a	100.0a	43.3jl	0.0g
cyanazine 80W	2.4	100.0a	100.0a	100.0a	56.7gh	0.0g
atrazine 4L	1.2	91.7bc	99.3ab	100.0a	65.0fg	0.0g
atrazine 4L	1.6	97.0ab	100.0a	100.0a	70.0f	0.0g
metribuzin	.75	46.7g	98.0ab	100.0a	70.0f	51.7c
metribuzin	1.0	75.0f	100.0a	100.0a	85.0e	66.7b
*glyphosate	.5	100.0a	94.3a-c	97.7ab	100.0a	100.0a
glyphosate	.5	100.0a	93.3a-c	96.0b	96.0a-c	95.0a
tebuthiuron	.75	88.3e	68.3d	100.0a	26.7m	0.0g
tebuthiuron	1.5	100.0a	97.7ab	100.0a	90.7b-e	61.7b
cyanazine 4L	1.2	100.0a	97.0ab	98.3ab	85.0e	0.0g
cyanazine 4L	2.4	100.0a	100.0a	100.0a	97.7ab	30.0de
karbutilate	.75	100.0a	100.0a	100.0a	36.7 l	21.7ef
karbutilate	1.0	100.0a	100.0a	100.0a	40.0kl	20.0ef
karbutilate	2.0	100.0a	100.0a	100.0a	50.0h-j	33.3d
procyazine	2.0	90.0de	100.0a	100.0a	86.7de	18.3f
procyazine	3.0	91.7bc	100.0a	100.0a	88.3c-e	23.3ef

*Herbicide applied in 20 gpa of water carrier.

[1/] Means with the same letter(s) are not significantly different at the .05 level.

Chemical fallow with herbicide combinations. Lee, G. A. and H. P. Alley. The study was established at the Archer Agriculture Substation to evaluate herbicide combinations for weed control in a wheat fallow system. The herbicide treatments were made on April 23, 1974 when the air temperature was 65F, soil temperature 45F, relative humidity 60%, wind calm and skies clear. The sandy loam soil (60% sand, 24% silt, 16% clay and 1.0% organic matter) contained adequate moisture at the time of herbicide applications. Rainfall in the amount of .2 inch occurred within 72 hours after initial treatment; however, only .6 inch of precipitation was recorded during the next 60 day period. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa total volume of water carrier.

The weed infestation was comprised of tansy mustard, Russian thistle, redroot pigweed, downy brome and volunteer wheat. Approximately 80% of the total weed spectrum was downy brome. Weed control was determined by visual evaluation 72 days after initial treatment.

All herbicide combinations gave 90.7% or better control of the annual broadleaved weed species. No significant differences in percentage control of tansy mustard or redroot pigweed occurred with the herbicide combination. Atrazine-4L + paraquat at 1.2 + .5 lb/A resulted in significantly less control of Russian thistle compared to all other herbicide treatments. Cyanazine-80W + paraquat at 1.6 + .5 lb/A, atrazine-4L + glyphosate at 1.2 + .5 lb/A, and atrazine-4L + cyanazine-80W at .75 + 1.5 lb/A and 1.0 + 2.0 lb/A eliminated the broadleaved weed spectrum. Cyanazine-80W + glyphosate and atrazine-4L in combination with glyphosate and paraquat resulted in significantly better control of downy brome compared to all other treatments. Previous data indicates that atrazine is more effective than cyanazine at equal rates for downy brome control. The addition of glyphosate to cyanazine and atrazine appears to enhance the control of downy brome compared to paraquat. Cyanazine-80W + paraquat and cyanazine-80W + atrazine-4L combinations resulted in ineffective control of downy brome. Cyanazine-80W + glyphosate at 1.2 + .5 lb/A and 1.6 + .5 lb/A resulted in significantly better control of volunteer wheat compared to all other herbicide combinations. Atrazine-4L + cyanazine 80W combinations gave no control of volunteer wheat and poor control of downy brome which may be attributed to the lack of precipitation during the study period. (Wyoming Agric. Expt. Sta., Laramie, SR-612.)

Effect of herbicide combinations on annual broadleaved and grassy weed species in a wheat fallow system at Archer Agricultural Substation, Cheyenne, Wyoming

Treatment	Rate lb/A	Percentage control: Tansy mustard	Russian thistle	Redroot pigweed	Downy brome	Volunteer wheat
cyanazine-80W + paraquat	1.2 + .5	97.7 a[1/]	100.0 a	100.0 a	50.0 b	21.7 d
cyanazine-80W + paraquat	1.6 + .5	100.0 a	100.0 a	100.0 a	55.0 b	20.0 d
cyanazine-80W + glyphosate	1.2 + .5	100.0 a	99.7 a	100.0 a	96.0 a	91.7 a
cyanazine-80W + glyphosate	1.6 + .5	96.0 a	96.7 a	100.0 a	95.3 a	91.3 a
atrazine-4L + paraquat	1.2 + .5	95.0 a	90.7 b	100.0 a	95.0 a	31.7 c
atrazine-4L + paraquat	1.6 + .5	96.0 a	97.3 a	100.0 a	91.7 a	31.7 c
atrazine-4L + glyphosate	1.2 + .5	100.0 a	100.0 a	100.0 a	98.3 a	75.0 b
atrazine-4L + glyphosate	1.6 + .5	99.7 a	100.0 a	100.0 a	98.0 a	78.3 b
atrazine-4L + cyanazine-80W	.75 + 1.5	100.0 a	100.0 a	100.0 a	36.7 c	0.0 e
atrazine-4L + cyanazine-80W	1.0 + 2.0	100.0 a	100.0 a	100.0 a	46.7 c	0.0 e

[1/] Means with the same letter(s) are not significantly different at the .05 level.

Herbicide evaluation for annual weed control in cicer milkvetch. Alley, H. P. and G. A. Lee. The need for weed control in established cicer milkvetch prompted the establishment of herbicide evaluation trials. The herbicides and combination of herbicides, as listed in the following table, were applied to dormant cicer milkvetch variety Lutana on March 3, 1974. The soil was classified as a sandy clay loam with a pH of 7.2, 3.0% O.M., 35% sand, 35% silt and 30% clay. The weed species complex was made up of 85% wild oats and 15% kochia and lambsquarter.

All treatments were applied with a three-nozzle knapsack sprayer in a total volume of 40 gpa water. Plots were one sq rd in size, randomized, with three replications.

Terbacil, terbacil + diuron, metribuzin and GS 14254 gave outstanding control of the annual grass and broadleaf weed species common to the experimental site and data indicate that these four compounds should be further evaluated.

The high rate of terbacil + diuron and both rates of GS 14254 were the only treatments which caused veinal chlorosis and phytotoxic damage to the cicer milkvetch. With the 1.2 lb/A of GS 14254 giving 100% control of both the grass and broadleaf weeds, lower rates may result in satisfactory weed control without resulting damage to cicer milkvetch. (Wyoming Agric. Expt. Sta., Laramie, SR-627.)

Weed control in cicer milkvetch

		Percent weed control[1/]		
Treatment	Rate/A ai	Wild oats	Kochia	Lambs-quarters
terbacil	0.4	80 c[2/]	100 a	100 a
terbacil	0.8	95 ab	100 a	100 a
terbacil + diuron	0.4 + 0.4	85 bc	100 a	100 a
terbacil + diuron	0.8 + 0.8	95 ab	100 a	100 a
terbacil + diuron	1.2 + 1.2	100 a	100 a	100 a
metribuzin	1.0	98 ab	100 a	100 a
metribuzin	1.5	99 a	100 a	100 a
bifenox	2.0	30 e	22 d	22 d
bifenox	3.0	53 d	80 b	70 b
GS 14254	1.2	100 a	100 a	100 a
GS 14254	1.6	100 a	100 a	100 a
pronamide	0.75	32 e	23 d	25 d
pronamide	1.5	37 e	37 c	40 c
R 7465	4.0	60 d	83 b	78 b
R 7465	6.0	60 d	80 b	77 b
pronamide + bifenox	1.0 + 2.0	35 e	28 cd	32 cd

[1/]Percent weed control on average of three replications. Visual determinations made 5/29/74.

[2/]Treatments followed by the same letter are not significantly different at the 5% level by Tukeys studentized range test.

Grass control in an irrigated legume pasture. Radosevich, S. R., A. K. Swenerton, and N. L. Smith. Foxtail barley is a perennial grass that severely reduces forage yield in irrigated legume pastures. A trial was initiated January 25, 1974 to evaluate phytotoxicity and control from soil and foliage-active materials in a birdsfoot trefoil-ladino clover pasture heavily infested with foxtail barley. Treatments were applied using a CO_2 sprayer on 10 by 20 ft plots. Spray volume was 27 gpa for all treatments except dinoseb + oil where 40 gpa of oil was used. The test plot area was fenced to prevent grazing. Weed control and crop phytotoxicity evaluations made on April 26, 1974 are shown in the following table. No phytotoxicity symptoms were observed on birdsfoot trefoil.

Effects of several herbicides applied to irrigated-legume pasture

		Control (0=none, 10=complete)		
Herbicide	AI/A(lbs)	Foxtail barley	General annuals	Ladino
oryzalin	2.0	0	0.8	0
nitralin	2.0	0	0	0
carbetamide	4.0	9.0	9.1	3.0
chlorpropham + PPG-124	4.0	1.3	8.0	0
pronamide	4.0	9.8	9.8	2.3
paraquat	0.5	3.3	7.5	1.5
dinoseb + oil	1.25 + 40 gpa	0	0.5	0
control	-	0	0	0

Both carbetamide and pronamide gave excellent control of foxtail barley and general annual weeds, but some reduction in stand of ladino clover was observed. Paraquat and chlorpropham + PPG-124 provided adequate control of annual weeds but did not give satisfactory control of foxtail barley. Oryzalin, nitralin and dinoseb + oil did not exhibit any degree of control at this observation date. (Coop. Ext., Univ. of California, Davis, and Solano Co.)

Herbicide combinations in sugarbeets. Hamilton, K. C. and H. F. Arle. Herbicide combinations were evaluated in sugarbeets (var. US H9B1) planted to a stand in rows 30 inches apart on beds at Mesa, Arizona. Barley and mustard seed was disked into the soil (sand 42%, silt 39%, clay 19%, and organic matter 1%), on October 2, 1973. On October 3, preplanting herbicides (see table) were applied and disked into the soil before shaping beds. Planting sugarbeet seed in dry soil was followed by a germination irrigation in every furrow. Postemergence applications were on October 24 when sugarbeets were 2 inches tall. Herbicides were applied in 40 gpa of water. Treatments were replicated four times on five-bed plots 30 feet long. The test was cultivated three times and tops of weeds were removed three times with a stalk chopper. Hand weeded checks were weeded two to seven times. Development of sugarbeets and weeds was observed every few weeks and sugarbeets were harvested and sucrose samples taken on June 28, 1974.

Preplanting applications of propham and NC-8438 severely stunted sugarbeet seedlings. Injury to sugarbeet seedlings was probably accentuated by the irrigation pattern. Where water is run in every furrow during the germination of single-row crops, salts and certain herbicides are concentrated in the seed row. The preplanting combination of propham and pyrazon reduced sugarbeet stands. Preplanting applications of cycloate and NC-8438 increased the injury caused by the postemergence application of phenmedipham. Best season-long weed control was with preplanting applications of NC-8438 followed by the postemergence application of phenmedipham and pyrazon. There was no significant difference between the yields of the two handweeded checks and five of the herbicide combinations. Weeds germinating after the first four weeks did not significantly reduce yields. Treatments did not affect the sucrose content of sugarbeets. (Cooperative investigation of Arizona Agr. Exp. Sta., Tucson; and Agricultural Research Service, U. S. Department of Agriculture, Phoenix.)

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

Treatments				Percent weed control and crop injury estimated 11/7/73			Yield of beets[1/]
Preplant Herbicide	rate (lb/A)	Postemergence Herbicide	rate (lb/A)	Barley	Mustard	Sugarbeets	T/A
cultivated check				0	0	0	7 c
hand weeded - 4 weeks (70 hr/A)				100	100	0	39 ab
hand weeded - all year (90 hr/A)				100	100	0	43 a
propham	3	phenmedipham and pyrazon	1 3	97	100	12	41 a
propham and pyrazon	3 2	phenmedipham	1	100	100	55	34 b
cycloate	2	phenmedipham and pyrazon	1 3	93	100	27	40 ab
NC-8438	1	phenmedipham	1	100	100	57	38 ab
NC-8438	1	phenmedipham and pyrazon	1 3	100	100	45	41 a

[1/] Values followed by the same letter are not significantly different at the 5% level of probability.

Preplant evaluation on sugarbeets, 1974. Sullivan, E. F. and L. O. Britt. Preplant herbicides were evaluated on sugarbeets at Longmont, Colorado and Scottsbluff, Nebraska. Applications were made logarithmically. Plots were 100 ft long by two rows at 22-inch spacing. Half-dosage distance measured 23.5 ft. Chemicals were applied in a 7-inch band to the soil surface and immediately incorporated with a tine tiller to a depth of 2 inches. Spray volume measured 43.7 gpa when the spray rig was operated at 2.25 mph at 32 psi with ES-4 nozzle tips. GW Mono-Hy D_2 was sown at the 2-inch depth and at 4 seeds per ft, simultaneously with chemical application. Seedbed condition at Scottsbluff was loose but smooth, and at Longmont the seedbed was cloddy and firm. Soil moisture was adverse for germination and no overhead moisture was received at both research sites within three weeks of treatment application. Surface irrigation promoted germination and chemical activity. The Longmont site (clay loam, 1.5% OM, pH 7.9) was treated on May 6 and the Scottsbluff site (sandy loam) was treated on May 1. Soil temperatures at establishment averaged 77°F at Longmont and 75°F at Scottsbluff. Major weeds in the untreated controls were redroot pigweed, kochia, foxtail species and barnyardgrass. Weed composition was quite narrow and redroot pigweed had a low density. Plant counts were taken four to five weeks after sowing within a 3-inch by 48-inch quadrat at a place in each row estimated to have the highest weed control with the least crop injury (optimal response). Results were analyzed statistically by computer. Average results from selected treatments are reported herein as percentages of the untreated controls (Tables 1 and 2). (Contribution of The Great Western Agricultural Research Center, Longmont, Colorado. Published with approval of the Director as Abstract No. 16H. Journal Series.)

Table 1. Effect of preplant mixtures on sugarbeets and weeds at Longmont, Colorado, spring 1974 (Experiment 201-202, two replications)

Herbicide	Max. rate (lb/A)	Optimum rate (lb/A)	Beet injury	Beet stand	Weed control RPw	Ko	Bl	Gr	Tot
					(Scores and seedling counts as % of control)				
H-26905	12	1.1	35	71	87	76	74	100	84
H-26910	12	2.0	15	103	95	62	70	98	82
CGA-24705	8	3.2	28	86	100	59	68	100	81
NC-8438	8	3.3	21	93	84	51	59	97	75
HOE-23408	8	2.2	18	92	83	35	45	96	66
H-18467	4	0.8	13	118	41	84	74	50	64
H-22234	12	3.7	10	84	95	16	34	98	62
buban 37	8	1.8	25	101	84	38	49	78	61
cycloate	12	2.7	20	96	68	8	22	95	54
HOE-22870	8	2.1	23	86	9	0	0	98	40
U-27267	6	1.6	18	97	68	5	20	76	44
pyrazon	12	3.7	18	107	68	13	26	44	33
Plant counts/sq ft (untreated check)				3.2	4.5	16.2	21.2	14.9	36.1

Note: Tot (total weed control); Bl (total broadleaf control); Gr (total grass control including foxtail spp and barnyardgrass); RPw (redroot pigweed); and Ko (kochia).

Table 2. Effect of preplant mixtures on sugarbeets and weeds at Longmont, Colorado and Scottsbluff, Nebraska, spring 1974 (Experiment 203, two replications each site)

Herbicide	Max. rate (lb/A)	Optimum rate (lb/A)	Beet injury	Beet stand	Weed control: RPw	Ko	Bl	Gr	Tot
					(Scores and seedling counts as % of control)				
H-22234 + lenacil	12 + 4	4.4 + 1.5	13	101	86	50	57	87	69
NC-8438 + diallate	8 + 4	1.6 + 0.8	22	101	96	42	56	97	71
NC-8438 + pyrazon	8 + 12	2.4 + 3.7	7	96	91	53	62	89	72
NC-8438 + H-22234	8 + 8	2.5 + 2.5	14	112	79	52	59	98	73
NC-8438 + cycloate	8 + 8	2.2 + 2.2	9	111	94	50	60	97	74
NC-8438 + pebulate	8 + 8	2.1 + 2.1	15	92	90	71	74	93	80
NC-8438 + Pre-Beta I	8 + 8	1.7 + 1.7	14	100	93	75	77	95	83
NC-8438 + buban 37	8 + 8	1.5 + 1.5	7	101	92	73	77	97	84
H-22234 + H-18467	12 + 3	4.7 + 1.1	12	91	98	78	83	91	86
cycloate + H-18467	12 + 3	3.9 + 0.9	13	104	94	81	84	93	87
NC-8438 + H-18467	8 + 3	3.0 + 1.1	12	92	100	90	91	94	92
Plant counts/sq ft (untreated check)				2.9	5.0	16.9	21.9	13.7	35.6

Note: See Table 1 for weed species symbol meaning.

Preplant applications for weed control in sugarbeets. Frey, C. R. and E. E. Schweizer. Experimental herbicides, applied alone or as mixtures, were compared to cycloate for the control of foxtail, redroot pigweed, and kochia in sugarbeets.

The experiment was conducted on a sandy clay loam soil with a pH of 7.6 and an organic matter of 2.4%. Herbicide treatments were replicated four times. On April 23, the herbicides were sprayed with water on a 7-inch band at a broadcast volume of 60 gpa. The preplanting treatments were incorporated 1½ inches deep with a power-driven incorporator and the preemergence treatments were applied to an 8.5 inch band immediately after planting. Sugarbeets were planted at the same time the herbicides were applied. Precipitation totaled 0.33 inches within a 14 day period.

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 4 inches by 10 ft, per treatment. The stand of weeds and sugarbeets in the treated plots is expressed as a percentage of those weeds present in the untreated check plots.

Weeds were not controlled satisfactory by any preemergence treatment because precipitation following application was insufficient. Conversely, the preplanting treatments controlled more weeds because the herbicides were mixed in the soil. Data from only the preplanting treatments will be discussed.

The stand of sugarbeets was reduced 1 to 53%, depending on the herbicide treatment (see table). The tolerance of sugarbeets to Ban 37 and encapsulated EPTC was marginal.

Ban 37 C, NC 8438, and several herbicide mixtures controlled foxtail better than cycloate alone. Redroot pigweed was controlled best with H 22234 or a mixture of 3 lb/A of cycloate plus 2 lb/A of NC 8438. The latter mixture also controlled kochia the best. Additional investigations with several of these herbicide mixtures are warranted since the total weed population was reduced most by several of these mixtures. (Western Region, Agricultural Research Service, U. S. Department of Agriculture, Fort Collins, Colorado 80523.)

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

Treatments		Sugarbeets[a/]		Weed control[a/] Stand reduction[b/]			
Herbicide	Rate	Stand red.	Injury rating	Ft	Pw	Ko	Avg
	(lb/A)	(%)		(%)			
Ban 37 C	4	32	29	78	74	0	51
Ban 37 C	6	53	41	98	92	28	73
H 22234	3	13	8	72	98	0	57
H 22234	4	12	6	81	99	2	61
LS 71 498	3	5	6	63	17	0	27
EPTC (encap)	3	23	64	98	92	2	64
NC 8438	2	1	0	99	47	0	49
cycloate	3	6	0	90	61	0	50
cycloate + Ban 37 C	3 + 3	31	29	96	92	11	66
cycloate + NC 8438	2 + 1	5	10	97	84	34	72
cycloate + NC 8438	3 + 2	9	21	100	99	84	94
Ban 37 C + NC 8438	3 + 2	30	31	98	88	74	87
lenacil + H 22234	0.8 + 3	11	8	81	95	0	59
lenacil + NC 8438	0.8 + 2	4	0	97	90	64	84

[a/] Evaluations - May 16: ratings of 0 = no weed control or sugarbeet injury, and 100 = all plants were killed.

[b/] Ft = foxtail, Pw = pigweed, Ko = kochia.

Postemergence applications for weed control in sugarbeets. Frey, C. R. 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 sandy clay loam soil with a pH of 7.6 and an organic matter of 2.4%. Herbicide treatments were replicated four times. The herbicides were sprayed in water on an 11-inch band on May 16 at a broadcast volume of 30 gpa. Sugarbeets were in the 4-leaf stage when treated. The size of individual weed species is given in the table.

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 quadrates, each 4 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.

Sugarbeet tolerance to these postemergent treatments was acceptable. Four treatments controlled at least 80% of the foxtail and five treatments controlled at least 83% of the redroot pigweed (see table). Mixtures of Hoe 22870 plus desmedipham and phenmedipham controlled kochia the best. Since the mixtures of Hoe 22870 plus desmedipham and Hoe 23408 plus desmedipham controlled weeds better overall than did phenmedipham, further evaluation of these mixtures is warranted. (Western Region, Agricultural Research Service, U. S. Department of Agriculture, Fort Collins, Colorado 80523.)

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

Treatments[a/]		Sugarbeet[b/] tolerance	Weed control[b/] Stand reductions				
Herbicides	Rate	rating	Fox-tail	Redroot pigweed	Kochia	Avg	Control rating
	(lb/A)	(%)		(%)			(%)
Dowco 290	1/8	2	3	18	7	9	0
Dowco 290	1/4	6	14	5	49	23	0
Hoe 22870	3/4	2	70	15	47	44	46
Hoe 23408	3/4	0	80	9	33	41	47
Hoe 22870 + desmedipham	3/4 + 1	16	72	86	59	72	85
Hoe 22870 + desmedipham	1½ + 1	19	83	83	80	82	87
Hoe 23408 + desmedipham	3/4 + 1	14	80	85	71	79	82
Hoe 23408 + desmedipham	1½ + 1	12	86	87	71	81	90
Dowco 290 + Hoe 22870	3/16 + 1	15	76	6	58	47	61
Dowco 290 + Hoe 23408	3/16 + 1	11	78	16	21	38	54
desmedipham	1	0	27	91	50	56	65
phenmedipham	1	2	43	5	79	42	65

[a/] Sprayed - May 16. Sugarbeets - 4 lv; grass - 4 to 5 lv; pigweed - 2 to 10 lv, 1" or less in ht; and kochia - 1 to 2" diameter, 1" or less in ht. All plants were growing well.

[b/] Evaluations - June 5. Ratings of 0 = no weed control or sugarbeet injury and 100 = all plants were killed.

Herbicides in row-planted, border-irrigated wheat. Hamilton, K. C. and H. F. Arle. Study of preemergence and postemergence applications of herbicides was continued during the past year in row-planted wheat grown with flood irrigation at Mesa, Arizona. Mustard was seeded on the test areas. On December 17, 1973, wheat (var. Siete cerros) was planted in rows spaced 12 inches apart. On December 18, herbicides (see table) were applied to the soil (sand 40%, silt 40%, clay 20%, and organic matter 1%) as preemergence treatments. The area was then flood irrigated. On January 23, postemergence herbicides were applied to wheat (3 inches tall) and mustard (.5 inches tall). Postemergence applications were in 40 gpa of water containing 0.25% of a blended surfactant. Treatments were replicated four times on 13.3 by 30 ft plots. Development of wheat and mustard was observed every few weeks and wheat was harvested by combine in June.

Preemergence applications of the higher rate of methazole and linuron caused chlorosis of wheat leaves. Methazole reduced wheat stands. Best weed control was with chlorbromuron and methazole. There was no significant difference in yield between preemergence treatments.

Postemergence applications of methazole injured wheat and reduced yield below that of the untreated checks. All postemergence applications, except dicamba, controlled mustard. (Cooperative investigations of Arizona Agr. Exp. Sta., Tucson, and Agricultural Research Service, U. S. Department of Agriculture, Phoenix.)

Response of wheat and mustard to preemergence and postemergence applications of herbicides at Mesa, Arizona, in 1974

Treatments		Percent crop injury and weed control estimated 3/27/74		Yield of grain[1/]
Herbicide	Rate (lb/A)	Wheat	Mustard	(lb/A)
Preemergence				
linuron	.37	5	77	4,160 a
linuron	.75	15	82	4,230 a
terbutryn	.37	0	42	4,310 a
terbutryn	.75	0	42	4,500 a
chlorbromuron	.75	2	92	4,230 a
methazole	.75	7	98	4,500 a
methazole	1.50	48	94	3,730 a
untreated check		0	0	4,090 a
Postemergence				
linuron	.25	0	100	4,640 a
terbutryn	.25	5	100	4,380 ab
chlorbromuron	.25	0	100	4,710 a
bromoxynil	.25	0	100	4,810 a
2,4-D, amine	.25	0	100	4,220 ab
dicamba	.25	0	52	4,310 ab
methazole	1.50	11	100	3,810 b
untreated check		0	0	4,570 a

[1/] For each method of application, values followed by the same letter do not differ significantly at the 5% level of probability.

Control of downy brome in winter wheat. Zimdahl, R. L. and J. M. Foster. Seven different herbicides including metribuzin were applied on a loam soil with 1.8% organic matter and a pH of 7.5. All but one of the treatments was applied in the fall and again in the spring. Fall applications were made on October 23, 1973 when the wheat was in the rosette stage and the downy brome grass had two to eight leaves. Spring applications were made on March 6 when the wheat was dormant and the downy brome was in the rosette stage. The temperature was 56°F.

On April 12 one-half pound of 2,4-D ester was applied by air overall to control tansy mustard. AC-92553 was applied February 22 prior to the application of all of the other spring treatments. Cyanazine was applied at 1/2 and 1 lb ai/A in the fall. These plots also received an additional 1/2 and 1 lb in the spring. There was no effect of the supplemental treatment when compared to one application.

The data in the table show that metribuzin was the only herbicide which gave satisfactory control of downy brome grass and that the spring applications were superior to the fall applications. However, observations of wheat injury showed approximately 20% stand reduction from .37 and .5 lbs of metribuzin per acre. In spite of this, yield tended to be above but was not significantly different from the check plot. The stand of downy brome was sparse. The fall plots had only three plants per two square feet and the spring plots one. This is not a sufficient density of weeds to cause a significant reduction in yield. Other than the metribuzin treatments there was almost no difference in the downy brome stand among the several treatments. No herbicide affected the yield of wheat when compared to the untreated control plots.

Of the herbicides tested, only metribuzin was sufficiently phytotoxic to downy brome to warrant further experimentation. These experiments have shown that it is necessary to apply metribuzin early in the season but it may not be necessary to apply it in the fall. (Weed Research Laboratory, Dept. of Botany and Plant Pathology, Colorado State Univ., Fort Collins.)

Downy brome control in winter wheat

Herbicide	Rate lbs ai/A	Fall application: Downy[1/] brome plants/ 2 sq ft	Fall application: Visual[2/] control rating	Fall application: Yield[3/] bu/A	Spring application: Downy[1/] brome plants/ 2 sq ft	Spring application: Visual[2/] control rating	Spring application: Yield[3/] bu/A
metribuzin	0.25	0.6	72	27.7	1.4	80	26.2
	0.37	0.8	76	21.8	0	98	23.8
	0.5	0	87	28.0	0	96	24.8
diuron	1.5	1.6	58	23.5	1.3	35	23.5
cyanazine	0.5	1.8	53	24.2	1.0	59	21.8
	1.0	0.8	64	26.8	1.6	59	20.8
atrazine	0.125	0.9	73	26.8	1.3	41	21.8
	0.25	1.1	68	25.0	2.0	50	22.1
	0.5	0.6	75	24.0	1.3	46	24.5
atrazine + cyanazine	0.75 +0.125	0.3	79	25.2	2.1	21	19.1
metribuzin + terbutryn	0.125 +0.6	1.6	54	27.9	1.3	69	25.9
tebuthiuron	0.25	0.9	68	27.8	2.1	26	21.3
AC 92553	1.5				1.0	33	19.7
	2.0				1.5	24	22.9
control	0.0	2.8	-	30.8	1.0	-	22.1

1/ Average of two counts in each plot on May 8.
2/ 0 = no control, 100 = complete control. Rating is an average of 2 separate visual evaluations.
3/ Acre yields computed from two adjacent hand harvested 8' rows.

<u>Postemergence control of downy brome in winter wheat.</u> Alley, H. P. and G. A. Lee. Changes in cultural practices in the production of winter wheat have created serious downy brome infestations in many of the winter wheat production areas. If the minimum tillage practices and elimination of deep plowing are to be a continued practice there is a need for either and/or both preplant and postemergence herbicide treatments to assist in alleviating the downy brome problem.

A postemergence series of individual and combination treatments were applied to a winter wheat field heavily infested with downy brome on March 25, 1974. The winter wheat, variety Scout, was in the 4-6 tiller stage of growth with 4-6 inch leaf height and the downy brome had 4-6 tillers and 1 to 2 inch leaf height at time of treatment. Ambient temperature at time of treatment was 56F, moisture was received before and within 24 hours following treatment. The soil at the treatment site was classified as a sandy loam, pH 7.4, 2.6% O.M., 53% sand, 33% silt, and 14% clay.

All herbicide treatments were applied with a 3-nozzle knapsack sprayer in a total volume of 40 gpa water. The plots were one sq rd, randomized with three replications.

Non-weeded and hand-weeded plots were included in the series in order to ascertain the competitiveness of downy brome and phytotoxicity of the respective herbicides toward the production of winter wheat. At time of weed control evaluations, those plots where downy brome control was apparent were harvested and winter wheat yield determinations made.

The competitiveness of downy brome and its seriousness to winter wheat production is clearly depicted in the yields obtained from the non-weeded and hand-weeded plots. Where the downy brome infestation was not removed and left in the wheat until harvest time, the winter wheat yield was only 5.8 bu/A, as compared to 23.8 bu/A from the hand-weeded plots.

All treatments which reduced the stand of downy brome resulted in either a stand and/or vigor reduction of the winter wheat. However, this was more than offset with the increased grain production from the herbicide treated plots as compared to a weedy-check.

The downy brome control and winter wheat production data obtained from these studies would indicate that seven herbicides and/or combinations should be further evaluated as potential candidates for downy brome control in winter wheat. (Wyoming Agric. Expt. Sta., Laramie, SR-626.)

Downy brome control in winter wheat

Treatment	Rate/A ai	Percent control downy brome	Yield bu/A	Winter wheat[1/] S	V
cyanazine	0.8	40 f		100	8
cyanazine	1.2	42 f		100	8
cyanazine	1.6	77 e	23.8 a	100	12
cyanazine + metribuzin	1.0 + 0.125	85 cd	19.3 ab	100	30
cyanazine + metribuzin	1.0 + 0.25	85 cd	19.8 ab	100	30
metribuzin	0.25	80 de		100	10
metribuzin	0.375	80 de	18.3 ab	80	20
metribuzin	0.5	90 bc	17.8 abc	70	30
molinate + propanil	0.5 + 0.5	0 h		100	10
molinate + propanil	1.0 + 1.0	0 h		100	10
molinate + propanil	2.0 + 2.0	0 h		100	10
diuron	0.8	0 h		100	0
diuron	1.6	0 h		100	0
linuron	0.75	0 h		100	8
bifenox	0.5	0 h		95	10
bifenox	1.0	0 h		85	18
bifenox	1.5	0 h		78	22
terbutryn + metribuzin	1.0 + 0.25	90 bc	13.8 bc	75	20
terbutryn + metribuzin	0.5 + 0.5	90 bc	10.8 cd	75	30
procyazine	1.6	88 c	19.8 ab	95	0
procyazine	2.0	95 ab	21.9 a	100	12
terbutryn + procyazine	1.0 + 1.0	95 ab	19.6 ab	100	15
terbutryn	1.0	32 g	21.0 ab	100	10
weedy control		0 h	5.8 de	65	52
hand weeded		100 a	23.8 a	100	0

[1/] S = winter wheat stand reduction, V = winter wheat vigor reduction. Treatments followed by the same letter are not significantly different at the 5% level by Tukeys studentized range test.

Difenzoquat (Avenge*) for wild oat control in wheat and barley - Western States. Colbert, D. R., C. L. Amen, R. S. Nielsen, and C. C. Papke. Field experiments were established in 1972-74 at various locations in Washington, Oregon, Idaho, Utah, California, and Arizona with the following objectives: (1) determine the optimum rate and time of difenzoquat applications for wild oat control when applied alone or in combination with broadleaf herbicides, (2) evaluate wheat and barley selectivity, and (3) obtain yield data.

Treatments of difenzoquat were applied postemergence to the wild oats when they were in the three to five leaf stage of growth. Results from some of these field trials are summarized in the following table.

Results showed that postemergence applications of difenzoquat at .62 to 1.0 lb ai/A were effective in controlling wild oats selectively in wheat and barley varieties commonly grown in the West. Tank-mix combinations with either 2,4-D, MCPA, or bromoxynil performed quite similar to difenzoquat alone. Grain yields were increased substantially over the weedy check. (Agriculturist, American Cyanamid Company, Lodi, California.)

Difenzoquat (Avenge*) for wild oat control in wheat and barley

		Oakesdale, Wa.		Cove, Utah		Bellevue, Id.		Shandon, Ca.	
Treatment	lb ai/A	% W.O. control	Yield bu/A	% W.O. control	Yield bu/A	% W.O. control	Yield bu/A	% W.O. control	Yield lb/A
difenzoquat	.62	90	59			90	70		
difenzoquat	.75	93	60	79	39	90	65	96	3911
difenzoquat	1.0	95	62	75	40			97	3911
difenzoquat	1.5			93	41				
difenzoquat + 2,4-D LVE	.75 + .38	87	58						
difenzoquat + MCPA	.75 + .5	89	60						
difenzoquat + bromoxynil	.75 + .5	85	63						
Barban	.38							78	2961
Barban	.38	10	56						
Barban	.5			45	37				
check	-	0	51	0	31	0	57	0	3218

Spring barley locations
Bellevue, Id. (Steptoe)
Shandon, Ca. (Briggs)

Winter wheat location
Oakesdale, Wa. (Nugaines)

Spring wheat location
Cove, Utah (Fremont)

Wild oat control in winter wheat. Lee, G. A. and H. P. Alley. The experiment was initiated near Sheridan, Wyoming to determine the effectiveness of several postemergence applied herbicides for wild oat control in winter wheat. The wild oat plants were in the 3- to 5-leaf stage of growth and the wheat (variety Scout) was 6 inches tall and had 7 to 10 tillers when the postemergence herbicides were applied on May 9, 1974. The wheat foliage was sufficiently large to act as a canopy cover for wild oat plants growing in the drill row. Plots were 1 sq rod in size and each herbicide treatment was replicated three times in a randomized complete block design. The soil at the location is classified as a silt loam (28% sand, 57% silt, 15% clay, 4.5% organic matter and 7.3 pH). Conditions at the time of herbicide application were: air temperature 50F, soil temperature 65F, relative humidity 50%, wind 10 mph, and skies cloudy. The soil surface was dry but moist at a depth of 1.5 to 2.0 inches. No precipitation was received until three weeks after initial herbicide applications. The herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa water carrier. All difenzoquat treatments were applied at a 45° and 180° angle in relation to the soil surface. Delivery angle was compared to determine if differences in coverage occurred. Percent wild oat control was determined by visual observation.

HOE-23408 at .75, 1.0 and 2.0 lb/A and SD-29761 at 1.0 lb/A resulted in 91.7% wild oat control. HOE-23408 at 1.0 and 2.0 lb/A reduced the wheat stand 8 and 30%, respectively. Winter wheat plants growing in plots treated with HOE-23408 at 2.0 lb/A exhibited premature ripening without mature grain. The stems were black and necrotic at the crown. Difenzoquat at 1.0 lb/A, alone and in combination with 2,4-D at .5 lb/A gave 55.7 to 72.0% wild oat control. Although the actual kill was significantly less than that obtained with HOE-23408 at 1.0 and 2.0 lb/A, the wild oats growing in plots treated with the high rate of difenzoquat did not produce spikes whereas plants in the nontreated check plots were producing fully developed caryopsis at the time of evaluation. SD-29761 at .5 and 1.0 and HOE-23408 at .75, 1.0 and 2.0 resulted in inhibition of wild oat seed production. (Wyoming Agric. Expt. Sta., Laramie, SR-610.)

Effect of postemergence herbicides on wild oat populations and winter wheat stands and vigor at Sheridan, Wyoming

Treatment	Rate lb/A	Winter wheat S[1]	Winter wheat V[2]	Percentage control Wild oats
difenzoquat	.62	100	0	12.0 gh[3]
difenzoquat	.75	100	0	44.7 d-f
difenzoquat	1.0	100	0	55.7 c-e
difenzoquat + 2,4-D Amine	.75 + .5	100	0	38.3 e-g
difenzoquat + 2,4-D Amine	1.0 + .5	100	0	57.0 cd
molinate + propanil	.5 + .5	100	0	2.7 h
molinate + propanil	1.0 + 1.0	100	0	17.3 f-h
molinate + propanil	2.0 + 2.0	100	0	26.7 f-h
SD-29761	.25	100	0	22.0 f-h
SD-29761	.5	100	0	84.7 a-c
SD-29761	1.0	100	4	91.7 ab
*difenzoquat	.62	100	0	36.7 e-h
*difenzoquat	.75	100	0	59.3 c-e
*difenzoquat	1.0	100	0	63.6 c-e
*difenzoquat + 2,4-D Amine	.75 + .5	100	0	44.0 d-g
*difenzoquat + 2,4-D Amine	1.0 + .5	100	0	72.0 b-d
HOE-23408	.75	100	0	91.7 ab
HOE-23408	1.0	92	10	97.3 a
HOE-23408	2.0	70	20	99.3 a
check	-	100	0	0 h

1/ Percent winter wheat stand.

2/ Percent vigor reduction of winter wheat plants.

3/ Means with the same letter(s) are not significantly different at the .05 level.

* Herbicide treatments directed into the foliage at a 45° angle.

PROJECT 6. AQUATIC AND DITCHBANK WEEDS

Floyd Oliver, Project Chairman

SUMMARY

One report was received. W. Powell Anderson of New Mexico reported results from application of glyphosate to eight perennial weed species common on irrigation ditchbanks and in agricultural areas of Texas and New Mexico.

A stand reduction of 95% in field bindweed was achieved with a rate of 6 lb/A whereas at 3 lb control was at borderline effectiveness. Texas blueweed treated at rates of 2.25 and 4.5 lb/A of glyphosate in 1973 and retreated in 1974 was eliminated. Four rates of the herbicide were applied to mixed stands of perennial weeds on an irrigation canal bank in 1974. Rates of 0.5 and 1.0 lb/A were too low to control any of the species present. Johnsongrass was effectively controlled with 2 and 4 lb/A. Glyphosate also controlled spiny aster, Texas blueweed, and silverleaf nightshade at this site. Bermudagrass, hogpotato, and wild licorice showed high tolerance; the former withstood as much as 6 lb/A.

Anderson categorizes the perennial weeds treated in this study on the basis of susceptibility to glyphosate. Johnsongrass was highly susceptible, Texas blueweed and silverleaf nightshade were moderately susceptible, hogpotato and wild licorice were resistant to other than foliar kill. He concludes that some regrowth occurs from all susceptible species treated and repeat applications are essential.

Perennial weed control with glyphosate. Anderson, W. P.[1/], T. H. Shrader[2/], M. Clary[3/], and R. Loya[4/]. Glyphosate was applied postemergence in 1973 and 1974 to established stands of perennial weeds, principally johnsongrass, field bindweed, and Texas blueweed, at dosages ranging from 0.5 to 6.0 lb/A in 20 gals of water per acre.

In 1973, glyphosate was applied on May 15 to field bindweed at dosages of 3 and 6 lb/A, replicated 14 times, to plots 9 by 30 feet in size. Visual evaluation of these treatments in the spring and late summer of 1974 indicated the following -- excellent initial control of field bindweed was obtained, with an estimated stand-reduction of about 95%, but retreatment of scattered regrowth is essential to prevent re-establishment. The 3 lb/A dosage appeared to be borderline for effective control of this weed, while 6 lb/A appeared to be quite adequate.

Also in 1973, a stand of Texas blueweed was treated postemergence with glyphosate at 2.25 and 4.5 lb/A, replicated 3 times, to plots 9 by 30 feet in size. Visual evaluations of these treatments in the spring of 1974 showed that better than 95% control of Texas blueweed had been obtained by the 4.5 lb/A treatment and possibly 75% control with 2.25 lb/A. On June 25, 1974, all of the Texas blueweed plots were retreated with glyphosate at 4 lb/A, and by late summer, 1974, the stand of Texas blueweed appeared to have been completely killed.

In 1974, glyphosate was applied postemergence to mixed stands of perennial weeds established on an irrigation canal bank. Glyphosate was applied at 0.5, 1.0, 2.0, and 4.0 lb/A, replicated 10 times, to plots 12 by 40 feet in size.

Visual evaluation of these treatments later in the summer of 1974 indicated that dosages of 0.5 and 1.0 lb/A of glyphosate were too low for control of any of the perennial weeds present. Excellent control of johnsongrass was obtained with glyphosate at 2 and 4 lb/A, but little or no control at 0.5 and 1.0 lb/A. Johnsongrass was one of the most susceptible perennial weeds to glyphosate, with a dosage of 2 lb/A as effective as 4 lb/A and the degree of control bordering on 98%. Other perennial weeds present that appeared to be effectively controlled by glyphosate were spiny aster, Texas blueweed, and silverleaf nightshade. Perennial weeds that showed a high degree of tolerance (other than initial browning or top-kill) to glyphosate included bermudagrass, hogpotato, and wild licorice. Common bermudagrass, treated in June, was not seriously injured by glyphosate at dosages as high as 6 lb/A; however, a later treatment in August appeared to be much more effective. Hybrid bermudagrass (Tifgreen) was killed in a home lawn by a single 6 lb/A treatment of glyphosate applied in September.

Based on the use of glyphosate in 1973 and 1974, a general summation of its effectiveness under the test conditions may be made. Perennial weeds may be roughly categorized into four groups on the basis of their susceptibility to glyphosate. For example, highly susceptible species, such as johnsongrass, are effectively controlled by glyphosate at about 2 lb/A; moderately susceptible species, such as Texas blueweed and silverleaf nightshade, are effectively controlled by dosages of 3 to 4 lb/A; least susceptible species, such as field bindweed and spiny aster, require a dosage of 4 to 6 lb/A for effective control; hard-to-kill species, such as hogpotato and wild licorice, do not, apparently, have their underground parts killed by dosages as high as 6 lb/A. Apparently, some regrowth (usually less than 5% at optimum dosage) of all susceptible perennial weeds treated with glyphosate occurs, and spot-treatment of the regrowth is essential to prevent reestablishment. Plants treated while under drought-stress do not respond to glyphosate. ([1,3]/Agric. Expt. Sta., New Mexico State University; [2,4]/Bureau of Reclamation, El Paso, Texas.)

PROJECT 7. CHEMICAL AND PHYSIOLOGICAL STUDIES

Alex G. Ogg, Jr., Project Chairman

No papers were submitted for this section.

HERBICIDE INDEX AND ABBREVIATIONS

Tables 1 and 2 below are approved nomenclature and abbreviation lists adopted by the Weed Science Society of America (Nomenclature, WEED SCIENCE 22(6), 1974. Authors are urged to use this terminology and abbreviation whenever applicable. Page NO refers to the page where a report about this chemical begins; actual mention of the chemical may be on the following page(s).

Table 1. Common and chemical names of herbicides[1/]

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
bromacil	5-bromo-3-sec-butyl-6-methyluracil	19
bromoxynil	3,5-dibromo-4-hydroxybenzonitrile	10, 107, 112
buban 37	3',5'-dinitro-4-(di-N-pylamino)acetophenone	101, 104
butam	2,2-demethyl-N-(1-methylethyl)-N-(phenylmethyl)propanamide	50
butylate	S-ethyl diisobutylthiocarbamate	64, 66, 68 70, 75
CGA-14397	(Chemistry unavailable)	37
CGA-17020	(Chemistry unavailable)	44, 92
CGA-24705	(Chemistry unavailable)	44, 66, 70 72, 73, 92, 101
carbetamide	D-N-ethyllactamide carbanilate (ester)	99
CDEC	2-chloroallyl diethyldithiocarbamate	37
chlorobromuron	3-(4-bromo-3-chlorophenyl)-1-methoxy-1-methylurea	107
chlorflurenol	methyl 2-chloro-9-hydroxyfluorene-9-carboxylate	4
chloroxuron	3-(p(p-chlorophenoxy)phenyl)-1,1-dimethylurea	42, 43
chlorpropham	isopropyl m-chlorocarbanilate	54, 56, 99
cyanazine	2-((4-chloro-6-(ethylamino)-s-triazin-2-yl)amino)-2-methylpropionitrile	45, 64, 66, 70, 72 73, 94, 95, 108, 109
cycloate	S-ethyl N-ethylthiocyclohexanecarbamate	99, 101, 104
cyprazine	2-chloro-4-(cyclopropylamino)-6-(isopropylamino)-s-triazine	64, 77
cyprazole	N-[5-[2-chloro-1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl] cyclopropanecarboxamide	50

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
DPX-3674	3-cyclohexyl-6-(dimethylamino)-1-methyl-s-triazine-2,4(1H,3H)-dione	26, 30
DS-17338	(Chemistry unavailable)	18
DS-18507	(Chemistry unavailable)	18
dalapon	2,2-dichloropropionic acid	7, 25
DCPA	dimethyl tetrachloroterephthalate	33, 44, 54, 56
DD	Mixture of 1,2- 1,3- 2,3 and 3,3 dichloro=propene, and related C_3 chlorinated hydrocarbons	3
desmedipham	ethyl m-hydroxycarbanilate carbanilate (ester)	105
diallate	S-2,3-dichloroallyl)diisopropylthiocarbamate	101
dibutalin	N-sec-butyl-4-tert-butyl-2,6-dinitroaniline	84, 86
dicamba	3,6-dichloro-o-anisic acid	4, 6, 64, 107
dichloroprop	2-(2,4-dichlorophenoxy)propionic acid	21
difenzoquat	1,2-dimethyl-3,5-diphenyl-1H-pyrazolium methyl sulfate	57, 58, 61 112, 114
dinitramine	N^4,N^4-diethyl-α,α,α-trifluoro-3,5-dinitrotoluene-2,4-diamine	33, 36, 50 84, 86, 88, 90
dinoseb	2-sec-butyl-4,6-dinitrophenol	39, 53, 99
diphenamid	N,N-dimethyl-2,2-diphenylacetamide	36
dipropetryn	2-(ethylthio)-4,6-bis(isoproplyamino)-s-triazine	82, 84, 86
diuron	3-(3,4-dichlorophenyl)-1,1-dimethylurea	6, 7, 8, 33 53, 54, 79, 80, 81, 86, 98, 108, 109
Dowco 290 (see M 3785)		
DSMA	disodium methanearsonate	79, 80

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
endothall	7-oxabicyclo(2,2,1)heptane-2,3-dicarboxylic acid	39
EPTC	S-ethyl dipropylthiocarbamate	38, 50, 64 68, 70, 73, 88, 90, 92, 104
ethiolate	S-ethyl diethylthiocarbamate	74, 77
FMC 25213	r-2-ethyl-5-methyl-c-5-(2-methylbenzyloxy)-1,3-dioxane	26, 29, 30
FMC 23486	(Chemistry unavailable)	26, 29, 30
fluchloralin	N-(2-chloroethyl)-2,6-dinitro-n-propyl-4-(trifluoromethyl)aniline	84, 86, 88
fluometuron	1,1-dimethyl-3-(α,α,α-trifluoro-m-tolyl)urea	80, 82
fluorodifen	p-nitrophenyl α,α,α-trifluoro-2-nitro-p-tolyl ether	90, 92
GK 40	(Chemistry unavailable)	6
GS 14254	2-sec-butylamino-4-ethylamino-6-methoxy-s-triazine	45, 53, 98
glyphosate	N-(phosphonomethyl)glycine	2, 4, 6, 7 8, 10, 12, 19, 21, 25, 26, 30, 37, 47, 62, 94, 95, 116
H 18467	(Chemistry unavailable)	101
H 22234	N-chloroacetyl-N-(2,6-diethylphenyl)-glycine ethyl ester	38, 64, 88 90, 101, 104
H 25893	N-chloroacetyl-N-(2,6-dimethylphenyl)-glycine isopropyl ester	38
H 26910	N-chloroacetyl-N-(2-methyl-6-ethylphenyl) glycine isopropyl ester	38, 101
H 26905	0-ethyl-0-(3-methyl-6-nitrophenyl)-N-sec-butyl-phosphorothioamedate	88, 92, 101
HOE 22870	(Chemistry unavailable)	50, 101, 105

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
HOE 23408	(Chemistry unavailable)	50, 58, 61, 101, 105, 114
isopropalin	2,6-dinitro-N,N-dipropylcumidine	36
karbutilate	*tert*-butylcarbamic acid ester with 3-(*m*-hydroxyphenyl)-1,1-dimethylurea	16, 18, 22, 94
LS-71498	(Chemistry unavailable)	104
lenacil	3-cyclohexyl-6,7-dihydro-1*H*-cyclopentapyrim=idine-2,4(3H,5H)-dione	101, 104
linuron	3-(3,4-dichlorophenyl)-1-methoxy-1-methyl=urea	81, 107, 109
M 3785 (Dowco 290)	3,6-dichloropicolinic acid	4, 105
MBR 11464	(Chemistry unavailable)	26, 29, 30
MBR 12325	(Chemistry unavailable)	26, 29, 30, 37
MC 8475	(Chemistry unavailable)	66, 88, 90
MC 8479	(Chemistry unavailable)	66, 88, 90
MCPA	((4-chloro-*o*-tolyl)oxy)acetic acid	58, 112
methazole	2-(3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazolidine-3,5-dione	42, 107
metribuzin	4-amino-6-*tert*-butyl-3-(methylthio)-*as*-triazine-5(4H)one	4, 37, 52, 64, 94, 98, 108, 109
molinate	*S*-ethyl hexahydro-1*H*-azepine-1-carbothioate	50, 61, 109, 114
MSMA	monsodium methanearsonate	41, 62, 79
NC 8438	2-ethoxy-2,3-dihydro-3,3-dimethyl-5-benzofuranyl methanesulphonate	88, 90, 92, 99, 101, 104
napropamide	2-(α-naphthoxy)-*N*,*N*-diethylpropionamide	26, 37, 38, 98

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
nitralin	4-(methylsulfonyl)-2,6-dinitro-N,N-dipropylaniline	33, 50, 84 86, 88, 90, 99
nitrofen	2,4-dichlorophenyl-p-nitrophenyl ether	41, 42
norflurazon	4-chloro-5-(methylamino-2-(α,α,α-trifluoro-m-tolyl)-3(2H)-pyridazinone	29
oryzalin	3,5-dinitro-N^4,N^4-dipropylsulfanilamide	26, 29, 30 84, 86, 99
oxadiazon	2-tert-butyl-4-(2,4-dichloro-5-isopropoxy=phenyl)-Δ2-1,3,4-oxadiazolin-5-one	26, 29 30, 42
PPG 124	p-chlorophenyl-N-methyl carbamate	54, 56, 99
paraquat	1,1'-dimethyl-4,4'-bipyridinium ion	7, 10, 33 39, 95, 99
pebulate	S-propyl butylethylthiocarbamate	101
phenmedipham	methyl m-hydroxycarbanilate m-methylcarbanilate	99, 105
picloram	4-amino-3,5,6-trichloropicolinic acid	4, 6, 18
Pre-Beta 1	Mixture of pebulate and diallate	101
procyazine	2-[[4-chloro-6-(cyclopropylamino)-1,3,5-triazine-2-yl]amino]-2-methylpropanenitrile	64, 66, 70, 72 73, 94, 109
profluralin	N-(cyclopropylmethyl)-α,α,α-trifluoro-2,6-dinitro-N-propyl-p-toluidine	33, 82, 84 88, 90
prometryn	2,4-bis(isopropylamino)-6-(methylthio)-s-triazine	80, 81, 82 84, 86
pronamide	3,5-dichloro-N-(1,1-dimethyl-2-propynyl)=benazmide	29, 34, 50 52, 56, 98, 99
propachlor	2-chloro-N-isopropylacetanilide	75
propanil	3',4'-dichloropropionanilide	50, 61, 109, 114

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
propham	isopropyl carbanilate	99
pyrazon	5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone	99, 101
R 7465 (see napropamide)		
R 24191	1-m-t butylacetamidophenyl)-3-methyl-3-methoxy urea	18
R 25788	N,N-diallyl-2,2-dichloroacetamide	64, 68, 70, 73, 75
R 29148	(2,2,5-trimethyl)-N-dichloroacetyl= oxazolidine	68
R 31401	(Chemistry unavailable)	66, 68, 72
RH 2915	(Chemistry unavailable)	26, 29, 30
RP 15018	(Chemistry unavailable)	26, 29, 30
RP 20810	(Chemistry unavailable)	29, 30
S 21634	1-methyl-4-phenylpyridinium chloride	41
S 6044	Mixture of butam and cyprazole	50
SD 29761	methyl-2-[benzoyl(3-chloro-4-fluorophenyl)-amino]propanoate	58, 61, 114
SN 45311	(Chemistry unavailable	30
SN 49962	(Chemistry unavailable)	26, 29, 30
siduron	1-(2-methylcylohexyl)-3-phenylurea	44, 47
silvex	2-(2,4,5-trichlorophenoxy)propionic acid	6, 19, 21, 47
simazine	2-chloro-4,6-bis(ethylamino)-s-triazine	26, 29, 30 33, 45, 52
tebuthiuron	N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol--2-yl]-N,N'-dimethylurea	19, 94, 108
terbacil	3-tert-butyl-5-chloro-6-methyluracil	52, 98

Table 1. Herbicide index (continued)

Common name or designation	Chemical name[2/]	Page NO
terbutryn	2-(tert-butylamino)-4-(ethylamino)-6-(methylthio)-s-triazine	107, 108, 109
telone	1,3-dichloropropene	3
triallate	S-(2,3,3-trichloroallyl)diisopropylthio=carbamate	58
trifluralin	α,α,α-trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine	6, 7, 8, 33, 36, 37, 50, 81, 82, 84, 86, 90
U 27267	3,4,5-tribromo-N,N-α-trimethylpyrazole-1-acetamide	38, 101
USB 3153	(Chemistry unavailable)	26, 29, 30
VCS 3438	(Chemistry unavailable)	26, 29, 30, 34
VCS 5026	(Chemistry unavailable)	26
VEL 5026	(Chemistry unavailable)	72
VEL 5028	(Chemistry unavailable)	72
vernolate	S-propyl dipropylthiocarbamate	64, 68, 75
WL 29761	methyl-2-benzoyl(3-chloro-4-fluorophenyl)-amino propanoate	57
2,4-D	(2,4-dichlorophenoxy)acetic acid	10, 12, 16, 19, 21, 26, 30, 58, 61, 107, 112, 114
2,4-DB	4-(2,4-dichlorophenoxy)butyric acid	53
2,4,5-T	(2,4,5-trichlorophenoxy)acetic acid	12, 15, 16, 19

1/ Herbicides no longer in use in USA are omitted. Complete listing, including these, is in WEEDS 14(4), 1966.

2/ As tabulated in this paper, a chemical name occupying two lines separated by an equal (=) sign is joined together without any separation if written on one line.

Table 2. Abbreviations of terms used in weed control

Abbreviations	Definitions
A	acre(s)
ae	acid equivalent
aehg	acid equivalent per 100 gallons
ai	active ingredient
aihg	active ingredient per 100 gallons
bu	bushel(s)
cfs	cubic feet per second
cu	cubic
diam	diameter
fpm	feet per minute
ft	foot or feet
g	gram(s)
gal	gallon(s)
gpa	gallons per acre
gph	gallons per hour
gpm	gallons per minutes
hr	hour(s)
ht	height
in	inch(s)
l	liter(s)
lb	pound(s)
mg	milligram(s)
mi	mile(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
mp	melting point
mhp	miles per hour
oz	ounce(s)
ppmv	parts per million by volume
ppmw	parts per million by weight
ppt	precipitate
psi	pounds per square inch
pt	pint(s)
qt	quart(s)
rd	rod(s)
rpm	revolutions per minute
sp gr	specific gravity
sq	square
T	ton(s)
tech	technical
temp	temperature
wt	weight
w/v	weight per volume (Do not use this abbreviation; instead give specific units, such as g/l or lb/gal)

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CROP INDEX

CROP INDEX (continued)

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