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1981 RESEARCH PROGRESS REPORT

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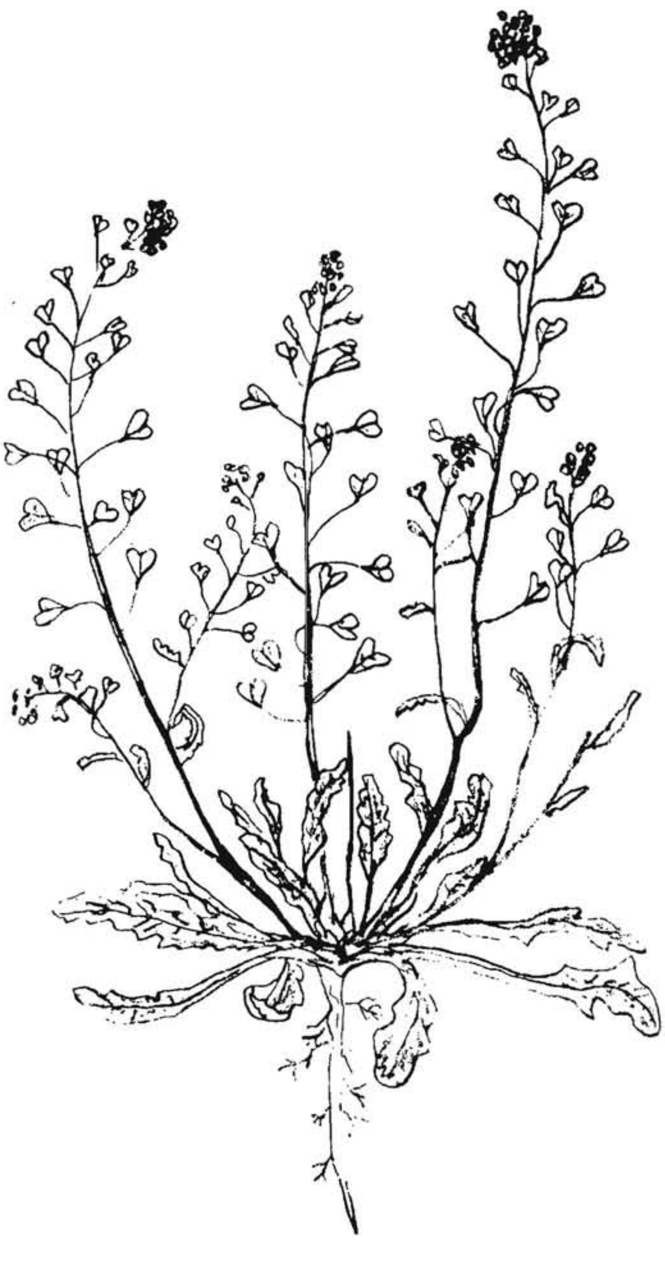

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FOREWORD

The Western Society of Weed Science 1981 Research Progress Report is a compilation of brief reports of recent investigations by weed scientist in the Western U.S. The primary function of this volume is to facilitate interchange of information within the weed science community; it is not meant to serve as a means of presenting conclusions, endorsements or recommendations to the general public or anyone else. In this report, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION. This represents an effort by the WSWS to make available effective research, improve communication among scientists having common interests, minimize duplication of effort, and to promote a sharing of the ideas.

This 1981 Western Society of Weed Science Research Progress Report is prepared by photoreproduction of the reports as submitted by the authors, without retyping or significant editorial changes. Content, format and style of each paper or report are the sole responsibility of the author(s). In the interest of information exchange, reports were accepted for printing except for profound deviations from WSWS editorial rules.

The accumulation of reports and some index work was the responsibility of the seven project chairmen. Final responsibility of putting the indices and reports together belongs to the research section chairman, who appeals for indulgence in the measure with which it has been granted.

Recognition and credit must go to the members of the Western Society of Weed Science whose efforts are reflected in the reports contained herein.

Phillip D. Olson
Chairman, Research Section
Western Society of Weed Science
1981

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PROJECT 1

PERENNIAL HERBACEOUS WEEDS

Ralph E. Whitesides - Project Chairman

SUMMARY -

Eighteen reports were prepared for the perennial herbaceous weeds section of the Research Progress Report. These reports dealt with bermudagrass, Canada thistle, creeping buttercup, dallisgrass, field bindweed, leafy spurge, Rocky Mountain iris, and a comparison of two formulations of dichlobenil for use as a perennial weed herbicide in deciduous trees.

Bermudagrass (3 reports) - Glyphosate treatments of 2, 3, or 4 lb ae/A were more effective than the 1 lb ae/A rate. Bermudagrass control did not differ when glyphosate was applied in 8, 16, or 25 gpa water at 3- or 4-month intervals or when glyphosate treatments were combined with a disking operation after application.

Canada Thistle (1 report) - Canada thistle control was near 100% when 0.5 lb ae/A Dowco-290 was applied under dryland conditions where no crop competition was present. When dryland wheat was present 0.25 lb ae/A Dowco-290 gave 100% Canada thistle control at harvest. DPX-4189 provided complete control of Canada thistle in dryland winter wheat at 0.125 lb ai/A or more.

Creeping Buttercup (1 report) - DPX-4189 provided 100% creeping buttercup control 7 weeks after application of 0.063, 0.125, and 0.25 lb ai/A.

Dallisgrass (1 report) - The addition of ammonium sulfate or X-77 to glyphosate increased effectiveness when applied to tall or short (regrowth from clipping) dallisgrass. Differences in activity with additives were greater at the 1.0 lb ae/A rate of glyphosate than the 2 lb rate.

Field Bindweed (4 reports) - DPX-4189 controlled field bindweed during the treatment year and into the next season with rates of 1.0 and 2.0 lb ai/A causing soil sterilization during the test period. Glyphosate at 2.0 and 4.0 lb ae/A gave good control during the treatment year with some carry-over effects on second season regrowth. Glyphosate treatments with ammonium sulfate were more effective during the early part of the growing season and differences were more apparent at the 1.5 lb ae/A rate than at the 3.0 lb ae/A rate. Tank mixtures or split applications of chlorflurenol, 2,4-D, dicamba, or glyphosate were not as effective 1 year after application to field bindweed as a single application of 2.0 lb ae/A dicamba. The combination of picloram/2,4-D amine (0.5 + 1.0 or 1.0 + 2.0 lb ae/A) was effective and gave 97 to 100% top growth control 2 years following treatment.

Leafy Spurge (6 reports) - Herbicide treatments or retreatments of picloram, dicamba, or combinations of both reduced the root systems of leafy spurge plants by 59 to 100%, however, estimates of the reduction in root systems after herbicide treatment cannot be made based on the appearance of the crown and primary root structure of leafy spurge plants. At the rates tested, leafy spurge control was not effective using DPX-4189, Dowco-290, Dowco-290/2,4-D amine, dicamba/2,4-D amine, and dicamba/glyphosate. Good control was obtained from tebuthiuron and dicamba, but desirable pasture grasses were injured. Picloram, dicamba, and picloram/2,4-D treatments gave good leafy spurge control in pasture and resulted in a forage increase when compared to the untreated check. Herbi applicator and conventional knapsack sprayer applications gave comparable leafy spurge control.

Rocky Mountain Iris (1 report) - Control of Rocky Mountain iris was most effective from glyphosate application at 2.0 lb ae/A.

Dichlobenil for Perennial Weed Control in Deciduous Trees (1 report) - Dichlobenil 50W plus polymer extender was nearly as effective a treatment as dichlobenil 4G and neither formulation caused significant injury to deciduous trees.

Response of two bermudagrasses to rates of glyphosate on disked and nondisked areas. Hamilton, K. C. and C. Doty. The responses of giant and common bermudagrass to rates of glyphosate were studied in two tests at Tucson, Arizona. In the spring of 1977 and 1978, 96 plants of giant and common bermudagrasses spaced 10 by 15 feet were established by planting rhizome segments from a single parent plant of each type. During the first year, seed heads were removed by mowing. Each year, low rates of trifluralin and simazine were applied to control annual weeds. Irrigation was similar to that used for cotton. Giant bermudagrass plants covered 21 sq. ft. and common bermudagrass plants covered 85 sq. ft. when treatments started in 1978 and 1979. Glyphosate at 1, 2, and 3 lb/A in 25 gpa of water was applied (a) 3-month intervals starting April 28, 1978 in the first test and (b) at 4-month intervals starting May 15, 1979, in the second test. Each plot contained four plants and treatments were replicated four times. In June the disked areas were disked about 4 to 5 inches deep.

All glyphosate treatments killed topgrowth of both giant and common bermudagrasses. All treatments reduced the size of both bermudagrass types in the spring of the years following herbicide treatments (see table). Disking increased the initial bermudagrass control with glyphosate but may have decreased final control of common bermudagrass. The higher rates of glyphosate gave better control than the 1 lb/A rate. There was no consistent difference in the response of giant and common bermudagrasses to glyphosate and disking. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Bermudagrass plants with topgrowth and area covered by live plants after applications of three rates of glyphosate on disked and nondisked areas

Treatments			Plants with topgrowth		Plant size sq. ft.	
Disked	Type	lb/A	May, 1979	May, 1980	May, 1979	May, 1980
Yes	Giant	1	9	3	0.5	0.3
Yes	Giant	2	3	2	0.1	0.1
Yes	Giant	3	1	3	0.1	0.3
Yes	Common	1	11	10	0.4	1.2
Yes	Common	2	1	11	0.1	1.8
Yes	Common	3	0	12	0	1.0
No	Giant	1	-	11	-	0.2
No	Giant	2	3	4	0.1	0.1
No	Giant	3	1	5	0.1	0.3
No	Common	1	-	5	-	0.4
No	Common	2	0	4	0	0.3
No	Common	3	0	4	0	0.1

Response of bermudagrass to glyphosate applied in three volumes of water. Hamilton, K. C. and C. Doty. The response of bermudagrass to glyphosate in three volumes of water was studied in two tests at Tucson, Arizona. In the spring of 1977 and 1978, 96 plants of common bermudagrass spaced 10 by 15 feet were established by planting rhizome segments from a single parent plant. During the first year, seed heads were removed by mowing. Each year, low rates of trifluralin and simazine were applied to control annual weeds. Irrigation was similar to that given cotton. Plants covered 100 and 70 sq. ft. when treatments started in 1978 and 1979. Glyphosate at 2 lb/A was applied 8, 16, and 25 gpa of water at 3- and 4-month intervals starting April 25, 1978 and May 15, 1979. Each plot contained four plants and treatments were replicated four times.

All glyphosate treatments killed topgrowth of bermudagrass. There was no difference in rate of kill between the three volumes of water. All treatments reduced the size of bermudagrass plants by 99% after 1 year (see table). There was no difference in the response of bermudagrass to glyphosate applied at 3- and 4-month intervals. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Bermudagrass plants with topgrowth and area covered by live plants after applications of glyphosate in three volumes of water

Treatments		Plants with topgrowth		Plant size sq. ft.	
Volume gpa	Months between	May, 1979	May, 1980	May, 1979	May, 1980
25	3	4	0	0.4	0
16	3	4	4	0.3	0.2
8	3	3	1	0.1	0.1
25	4	2	7	0.1	0.1
16	4	1	2	0.1	0.3
8	4	2	4	0.1	0.6

Response of irrigated and non-irrigated bermudagrass to three rates of glyphosate applied at two treatment intervals. Hamilton, K. C. and C. Doty. The response of common bermudagrass to rates of glyphosate and irrigation was studied in two tests at Tucson, Arizona. In the springs of 1978 and 1979, 198 plants of bermudagrass spaced 10 by 15 feet were established by planting rhizome segments from a single parent plant. During the first year, seed heads were removed by mowing. Each year, low rates of trifluralin and simazine were applied to control annual weeds. Irrigation was similar to that used for cotton. The non-irrigated plants were not irrigated after glyphosate was applied in the year of treatment. Bermudagrass plants covered 77 and 73 sq. ft. when treatments started in 1978 and 1979, respectively. Glyphosate at 2, 3, and 4 lb/A in 25 gpa of water was applied at 3- and 4- month intervals starting (a) April 28, 1978, in the first test, and (b) May 14, 1979, in the second test. Each plot contained four plants and treatments were replicated four times.

All glyphosate treatments killed topgrowth of bermudagrass. In the first test, glyphosate was more effective on the non-irrigated treatments and when applied at 3-month intervals (see table). These trends were not observed in the second test. In both tests the 2 lb/A rate was less effective than 3 and 4 lb/A of glyphosate. All treatments reduced the size of bermudagrass plants 99 to 100%. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Bermudagrass plants with topgrowth and area covered by living plants after applications of three rates of glyphosate on irrigated and nonirrigated areas

Treatments			Plants with topgrowth		Plant size sq. ft.	
Irrigated	lb/A	Months	May, 1979	May, 1980	May, 1979	May 1980
Yes	2	3	1	0	0.5	0
Yes	3	3	1	2	0.1	0.1
Yes	4	3	0	0	0	0
Yes	2	4	10	2	0.8	0.4
Yes	3	4	1	0	0.1	0
Yes	4	4	2	0	0.5	0
No	2	3	0	4	0	0.1
No	3	3	0	2	0	0.1
No	4	3	0	0	0	0
No	2	4	3	4	0.1	0.1
No	3	4	0	0	0	0
No	4	4	0	0	0	0

Canada thistle control with Dowco-290 and DPX-4189. Zimdahl, R.L. For several years, it has been accepted that picloram at rates as low as .50 lb ai/A may give 90+% control of Canada thistle with a single application. The problems with picloram have been its persistence, leachability in most soil types, and many broadleaf crops (e.g. field beans, sugarbeets, and potatoes) are susceptible to extremely small residues in soil. The Dow Chemical Company has worked to develop structural analogs of picloram and one of these, Dowco-290, has offered better control of Polygonaceae and Asteraceae species plus selectivity in small grains, corn, sorghum, crucifers, and flax. The half-life of Dowco-290 is approximately 30 days but varies with soil type and environmental conditions. We have worked with Dowco-290 for the control of Canada thistle under dryland conditions for the past four years. Our results from applications of 0, .25 and .50 lb ai/A are presented in Table 1 for five locations. The primary datum is the number of live Canada thistle plants/2 sq ft after application. It is evident from the data that rates of .25 and .50 lb ai/A do provide very good control of Canada thistle when compared to the untreated control. The data show that .50 lb gives consistently better and often 100% control. One-quarter pound seems to be slightly below the level needed for complete control. It is important to note that these data are from dryland plots and no crop competition was present.

Table 1. Canada thistle control with Dowco-290.

Location	Rate lb ai/A	Date appl.	Live Canada thistle plants per 2 sq ft on
			5/29/79
A	0.0	8/30/77	3.5
	0.25		0.6
	0.50		0.0
			6/10/78
B	0.0	7/7/77	11.5
	0.25		3.5
	0.50		1.6
			6/20/77
C	0.0	9/26/76	9.6
	0.25		1.5
	0.50		0.3
			5/27/80
D	0.0	6/22/79	20.4
	0.25		1.6
	0.50		0.5
			5/27/80
E	0.0	9/26/79	9.5
	0.25		1.9
	0.50		0.0

In 1979 we also used Dowco-290 in a study designed to determine its ability to selectively control Canada thistle in winter wheat. The dryland wheat was planted in the fall of 1979 and the treatments were applied on May 27, 1980. The wheat was fully tillered, 10-12 inches high, and in the pre-boot stage. The Canada thistle was 4-5 inches high, and in the pre-bud stage. The data (Table 2) show complete control of Canada thistle at the three highest rates in August of 1980 prior to wheat harvest. The only rate that did not give complete control was 0.125 lb ai/A and there the Canada thistle stand was significantly reduced when compared to the untreated check.

Table 2. Canada thistle control in wheat with Dowco-290 and DPX-4189.

	lb ai/A applied May 27, 1980	Live Canada thistle plants per 2 sq ft on Aug. 29, 1980
Dowco-290	0	5.0
	0.125	0.3
	0.25	0
	0.5	0
	1.0	0
DPX-4189	0	5.0
	0.063	0.6
	0.125	0
	0.25	0
	0.5	0

DPX-4189 is a new and very interesting herbicide because it is a combination of the basic urea and triazine groups. It is selective in small grains but several crops, including sugarbeets, appear to be sensitive to it. Rates as low as .25 oz ai/A will control velvetleaf, redroot pigweed, tansy mustard, lambsquarters, and shepherdspurse. Tolerant weeds include sandbur, johnsongrass, yellow nutsedge, wild oats, cheatgrass, and the nightshades. Our work with DPX-4189 has not been as extensive as that with Dowco-290 but it has shown that the compound offers great promise for control of Canada thistle. The data in Table 3 are the results of experiments at two locations at a range of rates and show complete control of Canada thistle one year after application. We are not sure what the lower rate for effective control is but it is obviously lower than 0.125 lb ai/A. Our work indicates that the rate may not be as low as 0.063 (Table 2). DPX-4189 was applied to wheat in the same experiment as Dowco-290 and all rates above 0.063 lb ai/A provided complete control of Canada thistle during that growing season. The level of reduction shown (from 5 to 0.6 plants/ 2 sq ft) would be classified as acceptable control by many growers. Unfortunately, we do not have good yield data from this study. However, we have no reason to suspect that either herbicide affected yield. (Weed Research Laboratory, Department of Botany and Plant Pathology, Colorado State University, Fort Collins, CO 80523).

Table 3. Canada thistle control with DPX-4189.

Location	Rate lb ai/A	Date appl.	Live Canada thistle plants per 2 sq ft on
			10/6/80
A	0.0	10/10/79	3.6
	0.125		0
	0.25		0
	0.5		0
			10/6/80
B	0.0	10/10/79	10.6
	0.5		0
	1.0		0
	2.0		0

Control of creeping buttercup in Tillamook County, Oregon. Whitesides, Ralph E. Many coastal pastures in the high rainfall areas of western Oregon are so badly infested with creeping buttercup that the economic return from the grazing lands is greatly reduced. A field trial was established in a waste area near Tillamook, Oregon to evaluate the effectiveness of several herbicides in controlling creeping buttercup. The trial was arranged as a randomized complete block with four replications. Plot size was 6 by 25 feet, and herbicide applications were made June 4, 1980 when the creeping buttercup was 18 to 24 inches tall and in full bloom.

Visual evaluations were made July 25, 1980. No treatment was more effective than DPX-4189. All rates tested gave 100% creeping buttercup control 7 weeks after treatment. MCPA, paraquat, and picloram effectively reduced the buttercup stand, however, the response to picloram varied from one replication to another. Bromoxynil, 2,4-D, dicamba, and Dowco 290 did not give acceptable control of creeping buttercup. (Crop Science Department, Oregon State University, Corvallis, Oregon 97331).

Creeping buttercup control in Tillamook County, Oregon

Treatment (June 4, 1980)	Rate lb active/acre	Visual Evaluation - % Control[a] (July 25, 1980)
2,4-D (amine)	1.0	16[b]
MCPA (amine)	1.0	78
Dicamba	0.25	14
bromoxynil	0.38	3
paraquat + 0.5% X-77[c]	0.38	73
DPX-4189 + 0.25% WK	0.25	100
DPX-4189 + 0.25% WK	0.125	100
DPX-4189 + 0.25% WK	0.0625	100
picloram	0.25	65
Dowco 290	0.25	3
check	---	0

[a]Evaluation scale: 0 = no control, 100 = complete control

[b]Average of four replications

[c]Surfactant added: percent of the later spray volume

Controlling of dallisgrass by glyphosate with additives. Jordan, L. S. and R. C. Russell. A field study was directed toward the possible use of ammonium sulfate or X-77 as additives in reducing the application rate of glyphosate in controlling dallisgrass. Test plots were located in a well established stand of dallisgrass in a lemon orchard in northern San Diego county. Glyphosate was applied alone and with the addition of either ammonium sulfate or additional surfactant. Test plots were divided equally to include dallisgrass 3 to 4 feet high in full seed stage and grass that had been recently mowed but with vigorous regrowth to about 8 inches high.

Glyphosate was applied at rates of 1, 2 and 4 lb ai/A. One and two lb ai/A treatments compared glyphosate with and without additives. Ammonium sulfate was applied in spray mixtures at a rate of 5 lb/A. Surfactant, X-77, was applied at a concentration of 0.5 percent of spray volume. Applications were made on June 22, 1978 with a constant pressure CO_2 sprayer at a volume of 50 gpa.

Plots were evaluated for weed control for 2 months. On August 18 the plot area was mowed. A rating of regrowth was made on September 21. Glyphosate treatments with and without additives at the 1 and 2 lb ai/A rates were more effective and had a much shorter response time on the tall fully developed grass as compared to treatments on the shorter mowed grass (See Table). Differences between treatments with and without additives were greater on the shorter grass. The addition of both ammonium sulfate and X-77 increased the effectiveness of glyphosate with greater differences at the 1 lb ai/A rate of glyphosate than at the 2 lb rate. Ratings of regrowth taken 5 weeks after close mowing indicated an increased residual control where either additive was used although control was at a low level in all treated plots. (Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

The effect of additives on the activity of glyphosate for controlling dallisgrass.

		Control of dallisgrass[2]				
	Rate	7/7/78		8/14/78		9/21/78
Herbicides[1]	lb ai/A	T	S[3]	T	S	[4]
Glyphosate	1	7.3	4.3	9.8	4.1	0.7
Glyphosate + $(NH_4)_2SO_4$	1 + 5	8.6	5.3	10.0	6.3	2.0
Glyphosate + X-77	1 + 0.5 %	9.3	7.0	10.0	4.6	2.0
Glyphosate	2	9.3	6.6	10.0	7.3	4.3
Glyphosate + $(NH_4)_2SO_4$	2 + 5	9.5	7.7	10.0	8.3	6.0
Glyphosate + X-77	2 + 0.5 %	10.0	9.0	10.0	7.3	5.3

Glyphosate	4	10.0	9.7	10.0	9.8	9.3

1/Herbicides applied on June 22, 1978.
2/0 = no control, 10 = all plants dead.
3/T = tall grass, S = short grass
4/Rating of regrowth 5 weeks after mowing.

Evaluation of glyphosate and DPX4189 for controlling field bindweed. Jordan, L. S. and R. C. Russell. Tests were established in a furrowed and bedded area of an open field located on the U.C.R. Moreno Field Station near Riverside. Field bindweed was permitted to grow to a solid stand in the plot area during spring and early summer. Herbicides were applied when the bindweed was in full bloom stage on July 10, 1979. DPX-4189 was applied at rates ranging from 1/16 to 2 lb ai/A with 0.25 percent of WK surfactant. Glyphosate was tested at rates of 2 and 4 lb ai/A. Applications were made at a spray volume of 50 gpa using a constant pressure CO_2 sprayer with a 3-nozzle spray boom. Test plot area was irrigated several times during the summer months to support weed growth.

Ratings throughout the growing season were based on control of field bindweed only. Some sprangletop infested a number of the test plots but did not become a competing factor. Evaluations were made until late November and further ratings, based on regrowth, were made the succeeding summer season.

Results indicated a strong persistance of DPX-4189 in the treated areas with control ranging from moderate at the lowest rate tested, to complete soil sterilization at the highest rates. Applications of DPX-4189 at the lower rates tested indicated less activity of the herbicide on grass species. Glyphosate at the 2 and 4 lb ai/A rates gave good control throughout the season with some carry-over effects on second season regrowth. A reversal of effect with respect to rate is unexplained. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521)

Effect of herbicide treatments on control of field bindweed.[1/]

Herbicide[1/]	Rate lb ai/A	Control of field bindweed[2/] [3/] 8/7/79	10/1/79	11/20/79	7/24/80
DPX-4189	0.062	7.8	7.8	7.0	6.2
DPX-4189	0.125	8.9	9.2	8.6	8.1
DPX-4189	0.25	9.6	9.8	9.8	8.9
DPX-4189	0.5	9.7	9.8	9.9	9.9
DPX-4189	1.0	9.8	10.0	10.0	10.0
DPX-4189	2.0	9.9	10.0	10.0	10.0
Glyphosate	2.0	8.4	8.5	8.1	7.6
Glyphosate	4.0	9.5	7.9	7.2	5.5

[1/]Herbicides applied July 10, 1979.
[2/]Average of four replicates
[3/]Scale: 0 = no control, 10 = all plants dead.

The effect of ammonium sulfate on the activity of glyphosate in controlling field bindweed. Jordan, L. S. and R. C. Russell. A field trial to study the effectiveness of ammonium sulfate as an additive to glyphosate in controlling bindweed was located in a lemon orchard on the Irvine Ranch near Tustin, California. The area of the orchard selected as a test site had a well established solid cover of field bindweed 6-8 inches high and in full bloom stage. The orchard was under drip irrigation with emitters in the tree row. The soil in the nonirrigated middles retained sufficient moisture to support vigorous growth of bindweed throughout the summer months.

Plots of 660 ft^2 covering both irrigated and nonirrigated areas were replicated 3 times. Treatments were applied on May 26, 1978 using a constant pressure CO_2 sprayer with a 3-nozzle spray boom. Glyphosate was applied without additives at rates of 1.5 and 3.0 lb ai/A in a spray volume of 50 gpa. A duplicate set of treatments was made with the addition of ammonium sulfate in the spray mixture at an applied rate of 5 lb/A.

Treatments were evaluated throughout the summer months and an additional rating for regrowth was made on May 24, 1979 (See Table). Differences between glyphosate treatments with or without ammonium sulfate were more significant at the 1.5 lb ai/A rate than at the 3 lb ai/A rate. The addition of ammonium sulfate had greater effect in the early part of the growing season following treatment than in late summer. Treatments including ammonium sulfate were more effective on second season regrowth, particularly at the lower treatment rate. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521)

The effect of ammonium sulfate on the activity of glyphosate in controlling field bindweed.1/

Herbicides1/	Rate lb ai/A	Control of field bindweed2/ 6/5/78	6/27/78	8/4/78	9/12/78	5/24/79
Glyphosate	1.5	2.0	5.8	7.4	7.4	4.3
Glyphosate + ammonium sulfate	1.5 + 5.0	2.7	8.0	8.7	8.4	6.0
Glyphosate	3.0	2.0	9.4	9.4	8.8	7.8
Glyphosate + ammonium sulfate	3.0 + 5.0	3.0	9.5	9.5	8.0	8.0

1/Treatments applied May 26, 1978.
2/Average of 3 replicates, 0 = no control, 10 = all plants dead.

<u>Vegetative top growth control of field bindweed resulting from selected herbicides and/or combinations as individual and/or multiple treatments.</u> Alley, H. P. and N. E. Humburg. The study was initiated to evaluate the effectiveness of selected herbicides applied individually, in combination, and as multiple treatments for control of field bindweed. Herbicides were applied July 3, 1979 to bindweed in full bloom and July 26, 1979 when the bindweed was past bloom. Treatments were arranged in a randomized complete block, 9 by 30 ft, with three replications. Herbicides were applied with a 6-nozzle knapsack sprayer in 40 gpa water carrier. Soil was classified as a sandy loam (71.6% sand, 15.6% silt, 12.8% clay, 1.6% organic matter, with a 8.1 pH).

Vegetative top growth reduction evaluations were made July 26, 1979 and July 23, 1980. Dicamba/chlorflurenol, at the early evaluation date, gave more rapid burn down and suppression of vegetative top growth than corresponding rates of dicamba alone and appears to give greater degree of top growth control one year following treatment even though percentages range from only 50 to 55%.

Dicamba, at an application rate of 2.0 lb ai/A, was the only treatment showing effective control after one year. The 2,4-D amine treatment gave immediate activity and burn down but was not as satisfactory as the dicamba/2,4-D amine combination in suppressing growth the following season. Multiple treatments of dicamba were not effective. The 2 lb ai/A rate of dicamba applied as one treatment was more effective than the same amount applied as a split application. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1048.)

Field bindweed vegetative top growth reduction

Herbicides	Rate lb ai/A	Vegetative Top Growth Control July 1979	Vegetative Top Growth Control July 1980
dicamba	0.25	40	0
dicamba	0.5	47	10
dicamba	1.0	67	38
dicamba	2.0	80	92
dicamba/chlorflurenol	0.25 + 0.25	50	55
dicamba/chlorflurenol	0.5 + 0.5	77	50
dicamba/chlorflurenol	1.0 + 0.5	77	55
chlorflurenol	0.5	20	0
dicamba/2,4-D amine	0.25 + 0.75	80	23
dicamba/2,4-D amine	0.5 + 1.5	87	78
2,4-D amine	0.75	80	40
dicamba/glyphosate	1.0 + 1.0	70	15
glyphosate	2.0	27	8
*dicamba	0.25/0.25	37	0
*dicamba	0.5/0.5	53	0
*dicamba	1.0/1.0	73	57
*dicamba/chlorflurenol	0.25 + 0.25/0.25 + 0.25	60	0
*dicamba/chlorflurenol	0.25 + 0.5 /0.25 + 0.5	47	0
*dicamba/chlorflurenol	0.5 + 0.5 /0.5 + 0.5	60	20

*Multiple treatments applied July 3 and July 26, 1979.

Field bindweed vegetative top growth control resulting from herbicide combinations. Alley, H. P. and N. E. Humburg. Herbicide combinations of glyphosate/dicamba, glyphosate/2,4-D amine and picloram/2,4-D amine were compared for their effectiveness to control field bindweed and to evaluate possible synergistic responses of glyphosate in combination with dicamba and 2,4-D amine.

Plots were established August 2, 1978 to field bindweed which was in full bloom. Approximately 1 inch of precipitation was received seven hours prior to treatment, with overcast skies at time of treatment. The soil, classified as a sandy loam (56.0% sand, 38.8% silt, 5.2% clay, 1.8% organic matter with a 7.8 pH) was saturated. All treatments were arranged in a randomized complete block, 18 by 18 ft, with three replications. All treatments were applied in 40 gpa water carrier.

Visual top growth control evaluations made July 29, 1979 and August 21, 1980 indicated that the picloram/2,4-D amine combination was the only effective treatment, giving 97 to 100% top growth control two years following treatment. The herbicide rates applied in the combinations, other than picloram/2,4-D, were not highly effective for bindweed control. The increased rate of application of a specific herbicide appeared to be the reason for a higher percentage control rather than the combination. (Wyo. Agric. Exp. Sta., Laramie, WY 82071, SR 1049.)

Bindweed top growth reduction.
One and two years following application.

Herbicides[1]	Rate lb ai/A	Percent Top Growth Control[2] 1979	1980
glyphosate	3.0	27	47
glyphosate/dicamba	1.5 + 0.5	40	47
glyphosate/dicamba	2.25 + 0.5	67	60
glyphosate/2,4-D amine	1.5 + 0.5	10	20
glyphosate/2,4-D amine	1.5 + 1.0	53	34
picloarm/2,4-D amine	0.5 + 1.0	98	99
picloram/2,4-D amine	1.0 + 2.0	100	100

[1]Herbicides applied August 2, 1978.
[2]Visual evaluations July 29, 1979 and August 21, 1980.

Effect of selected original treatments and selected retreatments as evaluated by live shoot regrowth and depth of dead roots of leafy spurge. Vore, R. E., H. P. Alley and N. E. Humburg. Excavations of the primary root system of leafy spurge were made to determine the extent of tissue destruction resultant from original/retreatment combinations. The extent of root destruction is a necessary measurement as to treatment efficacy for perennial weed control.

Desiccated leafy spurge crowns in selected original/retreatment combination areas were excavated. Crown selections were made randomly with observations made on several crowns in each treatment area. Excavations were performed by removal of the soil away from the primary, vertical root system without disturbing the fragile, decaying tissue. Depth of excavation was up to 3 ft below the soil surface to ensure the continuation of live root tissue. Measurements were made from the soil surface to the point where decayed/live root tissue joined.

The range of live root depth as found in a treatment area is reported in the following table. Minimum depth of root kill was found at 2 inches below the soil surface with maximum depth found to be 16 inches. This evaluation technique was concerned only with the destruction of the primary root system and did not account for treatment effect on the lateral roots and root hairs. As presented in the table, shoot control percentages were high even in areas where primary root kill was shallow. This suggests that the reduction in the entire root system cannot be adequately determined by evaluating only the crown and primary root structure. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1053.)

Leafy spurge shoot control and live root depth

Original Treatment[1] lb ai/A	Retreatment[1] lb ai/A	Percent Shoot Control[2]	Dead Root Depth (in)[2] Minimum	Maximum
picloram (2% beads) 2.0	picloram (K salt) 1.0	100	8	16
picloram (2% beads) 1.0	picloram (K salt) 1.0	98	5	7
picloram (2% beads) 0.5	2,4-D (amine) 2.0	78	2	8
picloram (K salt) 2.0	picloram (K salt) 1.0	99	8	16
picloram (K salt) 1.0	picloram (K salt) 1.0	99	4	10
dicamba 4L 8.0	picloram (K salt) 1.0	98	9	11
picloram (K salt) 1.0	dicamba 4L/2,4-D 1.0 + 2.0	99	8	8

[1]Original treatment May 25, 1978; retreatment June 21, 1979.
[2]Evaluated May 12, 1980.

Herbicide combinations and comparison of Herbi versus conventional application for leafy spurge control. Alley, H. P., R. E. Vore and N. E. Humburg. Various individual and/or herbicide combinations were evaluated for leafy spurge control; however, the main emphasis was to compare the effectiveness of the Herbi applicator with conventional knapsack application of picloram at two rates.

Plots were established May 24, 1978 on a solid stand of leafy spurge which was in the early-bud stage of growth with 10 to 14 inches top growth. The knapsack unit applied the herbicide in 40 gpa water; whereas, the Herbi treatments were applied in a total volume of 3.8 gpa.

Visual top growth control evaluations made on June 20, 1979, approximately 11 months after application, and May 12, 1980, two years following treatment indicate that only the picloram treatments gave 90% or greater top growth control. Dicamba and dicamba/2,4-D combinations gave around 80% reduction. The percentage control obtained with the Herbi was comparable to the conventional knapsack application which applied approximately 10 times as much carrier as the Herbi. With air movement less than 2 to 3 mph, the fine micron droplets, produced by the Herbi, moved off the target area; this was not apparent with the application made with the knapsack. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1050.)

Percent leafy spurge top growth control.
Herbi vs conventional knapsack one and two years following application.

Treatment[1]	Rate lb ai/A	Percent Control 1979	Percent Control 1980	Observations[2]
glyphosate	2.0	10	0	95% grass reduction
glyphosate/dicamba	1.5 + 0.5	0	0	50% " "
glyphosate/dicamba	2.25 + 0.5	0	0	50% " "
glyphosate/2,4-D A	1.5 + 0.5	0	0	50% " "
glyphosate/2,4-D A	1.5 + 1.0	0	0	50% " "
buthidazole 20G	3.0	0	0	95% grass reduction
buthidazole 20G	6.0	10	20	100% " "
buthidazole/dicamba	3.0 + 2.0	0	0	80% " "
buthidazole/dicamba	6.0 + 2.0	0	0	100% " "
dicamba	2.0	10	0	Grass okay-small spurge
dicamba	4.0	20	60	" " " "
dicamba	6.0	40	80	" " " "
dicamba/2,4-D	1.0 + 2.0	40	80	Grass okay-small spurge
dicamba/2,4-D	2.0 + 4.0	40	80	" " " "
picloram (Herbi)	1.0	90	90	No reduction in stand of grass; however prostrate growth. New spurge seedlings.
picloram (Herbi)	2.0	93	90	
picloram (conventional)	1.0	98	95	
picloram (conventional)	2.0	100	99	

[1]Herbicides applied May 24, 1978.
[2]Visual evaluations June 20, 1979 and May 12, 1980.

Effect of original/retreatment combinations on leafy spurge control as evaluated by live shoot regrowth. Vore, R. E., H. P. Alley and N. E. Humburg. Experiment establishment was for accumulation of original/ retreatment efficacy data for control of leafy spurge. Information is needed to support treatment selection for leafy spurge control programs on pasture and rangeland sites.

Original treatments were made May 25, 1978 when the leafy spurge was in the pre-bud to bloom stage of growth. Liquid formulations were applied with a garden tractor mounted spray unit in 128 gpa water carrier. The granule formulation was applied with a hand operated centrifugal broadcaster. Retreatments were made June 21, 1979 when the leafy spurge was in the pre-bud to bloom stage of growth, 8 to 14 inches high. Applications were made with a truck mounted spray unit in 32 gpa water carrier. Plots were 11 ft by 22 ft arranged in a split block design with two replications. Soil was clasified as a sandy loam (65.4% sand, 23.2% silt, 11.4% clay, 1.5% organic matter, pH of 7.7).

Shoot counts were made on May 12, 1980 to evaluate top growth control. Picloram 2% granule and picloram K salt at 2.0 lb ai/A were maintaining 95 and 96% top growth control, respectively, 24 months after treatment. Picloram K salt at 1.0 lb ai/A and picloram K salt/2,4-D at 1.0 + 2.0 lb ai/A were the only other treatments providing greater than 90% top growth control at that time.

Retreatment of picloram K salt at 1.0 lb ai/A, applied over all original treatments, maintained 98 to 100% top growth control eleven months following application. Other original/retreatment combinations provided varying percent top growth control with control being dependent upon the capacity of a combination to suppress leafy spurge regrowth. A combination including a highly effective original treatment and/or retreatment maintained a higher percent control than did combinations containing a less effective original treatment and retreatment. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1052.)

Leafy spurge shoot control

Original Treatment lb ai/A	Percent Shoot Control Retreatment, lb ai/A					
	picloram K salt 0.5	picloram K salt 1.0	dicamba 4L 2.0	2,4-D amine 2.0	dicamba 4L 1.0 2,4-D amine 2.0	Check
picloram (K salt) 2.0	99	99	98	98	99	96
picloram (K salt) 1.0	96	99	96	76	99	94
picloram (K salt) 0.5	94	99	49	70	59	43
picloram (2% beads) 2.0	98	100	96	90	96	95
picloram (2% beads) 1.0	99	98	87	84	65	51
picloram (2% beads) 0.5	99	99	69	78	64	32
picloram/2,4-D (amine) 2.0 + 4.0	99	100	99	81	78	91
picloram/2,4-D (amine) 1.0 + 2.0	96	100	68	63	39	38
picloram/2,4-D (amine) 0.5 + 1.0	97	99	49	58	40	0
dicamba 4L 8.0	87	98	89	74	78	66
dicamba 4L 4.0	84	100	67	53	56	42
Check	96	93	72	9	11	0

Forage production in an untreated leafy spurge infestation (check) and as affected by treatment. Vore, R. E., H. P. Alley and N. E. Humburg. Increasing forage production through removal of undesirable weed species is a beneficial aspect of perennial weed control programs on pastures and rangeland. Forage production increases ultimately yield added economic returns to livestock producers; thus, some or all treatment expenses are returned to the landowner as well as reclaiming land lost to perennial weeds. This study was undertaken to determine forage production as it relates to a leafy spurge infestation and the removal of this competition using herbicides.

Plots were established May 25, 1978. Liquid formulations and water carrier at 128 gpa were applied with a garden-mounted tractor sprayer. Granules were applied with a manual-operated centrifugal broadcaster. Plots were 11 ft by 22 ft, replicated twice. Annual average precipitation at the nearest recording station is 16.7 inches. Grass and grass-like species in the plot area were thread-leaved sedge, Kentucky bluegrass, western wheatgrass, blue grama grass, Japanese and downy brome. Plots were hand clipped on July 30, 1979 and July 29, 1980. Four 2.5 ft diameter quadrat areas were clipped per treatment. Pounds air-dry forage/A (12% moisture) were determined from clippings and average production was computed. Species were not separated as total forage production measurement was desired.

Total forage production in all treatment areas was from 218 to 724 lbs air-dry forage/A greater than that in the leafy spurge infestation (check) where the least production is recorded at 476 lb/A. Several factors affected forage production in this study. Moisture was limited in late 1979 and early 1980 thus reducing production in 1980. High rates of picloram and dicamba are noted for causing prostrate grass growth and also suppress total production. Species present in each quadrat area were variable, ranging to a single species to many, thus affecting the clipped weight. However, all treatment areas over a two year time period support an increase in forage production as compared to the infested or check area. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1054.)

Forage production one and two years after treatment

Treatment	Rate lb ai/A	Pounds Air Dry Forage/A[1]		
		1979	1980	Avg.
picloram (K salt)/2,4-D (amine)	2.0 + 4.0	1054	520	787
picloram (K salt)/2,4-D (amine)	1.0 + 2.0	1240	1160	1200
picloram (K salt)/2,4-D (amine)	0.5 + 1.0	930	616	773
picloram (K salt)	2.0	1098	1010	1054
picloram (K salt)	1.0	896	558	727
picloram (K salt)	0.5	1111	947	1029
picloram (2% beads)	2.0	992	601	796
picloram (2% beads)	1.0	981	786	884
picloram (2% beads)	0.5	1005	621	813
dicamba 4L	8.0	917	471	694
dicamba 4L	4.0	1137	665	901
Check	---	535	416	476

[1]Harvested July 30, 1979 and July 29, 1980.

Effect of herbicides and/or combinations upon top growth control of leafy spurge - one year following treatment. Alley, H. P., R. E. Vore and N. E. Humburg. New herbicides and combinations of various herbicides were evaluated for their potential to control leafy spurge.

Plots were established May 22, 1979 to leafy spurge that was in pre-bud to flower stage-of-growth, 6 to 12 inches tall. Conditions of spurge growth and subsoil moisture present indicated ideal conditions. The soil was classified as a sandy loam (55.4% sand, 32.2% silt, 12.4% clay, 0.6% organic matter with a 7.8 pH). All treatments were applied with a 6-nozzle knapsack experimental plot sprayer in 40 gpa water carrier. Plots were 9 by 30 ft, arranged in a randomized complete block with 3 replications.

Visual top growth control evaluations May 12, 1980 indicated that DPX-4189, Dowco 290 (M-3972) and the combination of Dowco 290/2,4-D amine had very little activity on leafy spurge top growth, at the rates evaluated. The combinations of dicamba/2,4-D amine and dicamba/glyphosate were not effective. Tebuthiuron (20G) killed the majority of the associated grass at all rates of application. Dicamba at 4.0 and 6.0 lb ai/A gave 83 to 88% control respectively, but badly damaged the grass. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1051.)

Herbicides, leafy spurge top growth control, one year following treatment

Herbicides[1]	Rate lb ai/A	Percent Control	Observations[2]
DPX 4189	0.125	0	Grass not damaged
DPX 4189	0.25	0	" " "
DPX 4189	0.5	0	" " "
tebuthiuron 20G	1.0	33	Killed grass
tebuthiuron 20G	2.0	60	Killed grass-spurge chlorotic
tebuthiuron 20G	4.0	87	Killed 90% grass-spurge leaves black
dicamba	2.0	50	Grass damaged
dicamba	4.0	83	Grass badly damaged
dicamba	6.0	88	Grass badly damaged
dicamba/2,4-D amine	0.5 + 1.5	16	Grass okay-spurge seedlings
dicamba/2,4-D amine	1.0 + 3.0	23	" " " "
dicamba/2,4-D ester	0.5 + 1.5	53	" " " "
dicamba/2,4-D ester	1.0 + 3.0	63	" " " "
dicamba/glyphosate	1.0 + 1.0	0	50% reduction of grass
dicamba/glyphosate	1.0 + 2.0	27	90% reduction of grass
Dowco 290 (M 3972)	1.0	0	Grass okay
Dowco 290 (M 3972)	2.0	0	" "
Dowco 290 (M 3972)	4.0	0	" "
Dowco 290/2,4-D (M 3785)	2 gal	43	Grass okay-spurge seedlings
Dowco 290/2,4-D (M 3785)	3 gal	43	Grass okay-spurge seedlings
Dowco 290/2,4-D (M 3785)	4 gal	47	50% reduction of grass

[1]Herbicides applied May 22, 1979.
[2]Visual evaluations May 12, 1980.

Effect of selected original treatments and selected retreatments as evaluated by leafy spurge regrowth and root presence at various soil depths. Vore, R. E., H. P. Alley and N. E. Humburg. This leafy spurge root control study was conducted to determine treatment efficacy on the entire root system of this perennial species. Root control data were compared with shoot control to discern similarity of the two evaluation techniques.

Original treatments were made May 25, 1978 with retreatments made June 21, 1979. Experimental design was a split block with two replications. Shoot counts were used to determine percent shoot control. Soil excavations were made using a 3 inch diameter, 8 inch long core auger. There were five subsamples taken randomly in each treatment area. Maximum sample depth was 32 inches which was separated into four equal portions. Soil was screened from the root segments which were then counted. Root segment weight was determined by estimating the minute pieces and weighing larger segments.

An extensive root system was uncovered in the leafy spurge infestation area (check) with root segments numbering 936.5/cu ft and weighing 47.3 g/cu ft. All treatments and combinations reduced the root system at least 58% with fourteen treatments providing 90% or better root control. The greatest reduction was realized from picloram K salt at 1.0 lb ai/A as both the original and retreatment, having only 4.6 root segments/cu ft weighing only 0.4 g. Four original/retreatment combinations completely eliminated the root system in the top 8 inches of soil. Root segments in the check were greatest in the 0 to 8 inch level and declined with increasing depth. Root segments were least in the 0 to 8 inch level when subjected to treatment and increased slightly with increasing depth. Percent shoot and root control is somewheat similar and shoot control may be an indication of reduction of the root system. However, more subsamples per treatment area are needed as is accumulation of more comparative data to support this relationship. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1055.)

Leafy spurge shoot and root control

Original / Retreatment	lb ai/A	% Control[1] Shoot	% Control[1] Root	Root Segments/cu ft Depth Zone (inches) 0-8	8-16	16-24	24-32	0-32	Root Wt g/cu ft 0-32 in
picloram-K salt	1.0								
picloram-K	0.5	96	98	0.8	4.6	4.6	9.2	19.2	4.6
picloram-K	1.0	99	99	0	0.8	1.5	2.3	4.6	0.4
dicamba 4L	2.0	96	92	17.6	12.2	14.5	26.7	71.0	4.5
None	--	94	96	2.3	10.7	4.6	16.8	34.4	4.2
picloram-K salt	2.0								
picloram-K	0.5	99	94	10.7	6.1	12.2	22.9	51.9	13.2
picloram-K	1.0	99	87	1.5	26.0	34.4	63.4	125.3	10.1
dicamba 4L	2.0	98	73	36.7	45.1	80.2	90.9	252.9	32.8
None	--	96	90	0.8	6.1	17.6	64.9	89.4	8.6
picloram-2% beads	1.0								
picloram-K	0.5	99	97	0	9.2	7.6	11.4	28.2	3.3
picloram-K	1.0	98	91	6.1	11.4	26.7	37.4	81.6	3.2
dicamba 4L	2.0	87	81	35.9	37.4	61.9	45.1	180.3	42.0
None	--	51	76	19.9	68.8	71.0	63.4	223.1	21.3
picloram-2% beads	2.0								
picloram-K	0.5	98	97	0	10.7	10.7	9.9	31.3	3.2
picloram-K	1.0	100	93	0	3.0	26.7	34.4	64.1	5.8
dicamba 4L	2.0	96	97	11.4	2.3	4.6	7.6	25.9	10.5
None	--	95	99	1.5	1.5	1.5	3.8	8.3	0.5
dicamba 4L	8.0								
picloram-K	0.5	87	89	14.5	26.0	35.9	27.5	103.9	10.8
picloram-K	1.0	98	98	4.6	1.5	1.5	11.4	19.0	8.3
dicamba 4L	2.0	89	94	9.9	13.8	3.0	24.4	51.1	12.4
None	--	66	89	13.0	27.5	24.4	33.6	98.5	11.4
None	--								
picloram-K	0.5	96	58	77.9	131.4	103.9	79.4	392.6	33.6
picloram-K	1.0	93	81	26.7	53.5	48.1	46.6	174.9	13.7
dicamba 4L	2.0	72	61	139.0	99.3	68.8	59.6	366.7	22.9
None	--	0	0	342.2	166.5	221.5	206.3	936.5	47.3

[1]Shoot evaluations May 12, 1980; root evaluations July 30, 1980.

Rocky mountain iris control in pasture. Whitesides, Ralph E. A field trial was established July 19, 1979, near Bandon, Oregon, to compare the effectiveness of several herbicides in control of Rocky Mountain iris. The trial was a randomized complete block design with four replications. An initial visual evaluation of the trial was conducted October 10, 1979, and indicated glyphosate and paraquat to be the most effective herbicides tested. A second evaluation approximately 10 months after treatment (May 29, 1980) showed a reduction in the control from the previous evaluation by paraquat treatments but an increase from glyphosate when applied at 2.0 lb ae per acre. (Crop Science Department, Oregon State University, Corvallis, Oregon 97331).

Rocky Mountain iris control in pasture

Treatment (July 19, 1979)	Rate lb active/acre	Visual Evaluation - % Control[a] Oct. 10, 1979	May 29, 1980
paraquat + X-77 (0.25%)[b]	0.5	64[c]	31
paraquat + X-77 (0.25%)	1.0	89	69
paraquat + 2,4-D + X-77 (0.25%)	1.0+1.0	81	46
2,4-D (amine)	4.0	6	3
paraquat + glyphosate	0.5+0.5	80	45
glyphosate	0.5	40	15
glyphosate	1.0	60	53
glyphosate	2.0	89	96
glyphosate + 2,4-D	1.0+1.0	49	64
Check	---	0	0

[a]Evaluation scale: 0 = no control, 100 = complete control

[b]Surfactant added: percent of total spray volume

[c]Average of four replications

A comparison of dichlobenil four per cent granular and dichlobenil fifty per cent wettable plus a polymer extender for use as a fall applied perennial weed herbicide. 1/Richards, W. D. On October 23, 1979, a trial was established at Pacific Coast Nursery Inc., Sauvie Island, on 4 deciduous tree varieties to determine the comparative effectiveness of 1 herbicide in 2 different formulations. The first formulation was a 4 per cent ai granular material and was applied alone. The second formulation was a 50 per cent ai wettable material and was applied in conjunction with a polymer extender at a 1 to 1 ratio. The polymer extender was supplied by G. Graham Allan, professor of fiber and polymer science, from the University of Washington. All 4 of the shade tree varieties were grown in the field from seed and were transplanted in the test area on May 11, 1979. These plants were white birch, cockspur hawthorn, littleleaf linden, and thornless honeylocust. The trees were planted in commercial rows 4 feet apart on a 1 foot spacing and the treatments were applied in an 18 inch by 12 foot plot and were replicated 3 times for each variety.

The herbicides applied to each variety were dichlobenil 4G at 3.75 lb ai/A and diclobenil 50W at 5 lb ai/A plus polymer extender in a 1 to 1 ratio. The treatments were applied on October 23, 1979.

Initial observations on weed control and crop tolerance were taken on December 20, 1979 with 2 subsequent checks made on February 25, 1980 and April 13, 1980. The plots were given a visual rating from Ø to 10 for weed control and crop tolerance. The weeds observed were annual bluegrass, chickweed, dandelion, foxtail, common lambsquarters, mustard, redroot pigweed, wild raddish, shepardspurse, and bull thistle.

The dichlobenil 4G proved to give only slightly better weed control than the dichlobenil 50W plus polymer extender and neither material caused any significant economic loss from crop tolerance. The materials should be compared in terms of cost and ease of application by the user. 1/(Research Supervisor, Pacific Coast Nursery Inc., Route 1, Box 320, Portland, Oregon 97231).

Comparison of dichlobenil 4G and dichlobenil 50W plus polymer extender for fall application

Treatment	Rate	birch	(test only) hawthorn	linden	locust
dichlobenil 4G	3.75 lb ai/A				
broadleaf control		10	9.1	10	9.1
grass control		9.7	9.8	10	9.8
crop tolerance		1.3	2.0	2.1	1.7
check	0				
broadleaf control		5.1	3.5	4.3	3.1
grass control		2.0	3.3	4.1	5.1
crop tolerance		0	0	1.0	1.0
dichlobenil 50W	5 lb ai/A				
plus a 1 to 1 ratio of	plus				
polymer extender	5 lb ai/A				
broadleaf control		10	9.5	9.5	8.5
grass control		9.5	9.1	9.0	8.5
crop tolerance		2.7	2.4	3.1	2.1

Control and crop tolerance are an average taken from 3 rating dates with 10 = total control or total crop kill.

PROJECT 2

HERBACEOUS WEEDS OF RANGE AND FOREST

S. D. Cockreham, Project Chairman

SUMMARY -

Fourteen papers were submitted for publication. Herbaceous range and forest weeds included foxtail barley, big sagebrush, meadow deathcamas, Canada thistle, caraway, rush skeletonweed, crupina, spotted knapweed, western needlegrass and squirreltail.

Foxtail Barley (two papers)

Three months following a spring treatment, metribuzin and hexazinone applied at 0.5 lb ai/A reduced the stand of foxtail barley in a tall wheatgrass pasture by 80% with pronamide showing little activity. One year after treatment, however, pronamide and hexazinone gave the best control.

Pronamide applied at 0.5 lb ai/A gave excellent control of foxtail barley clumps with no injury to Regar meadowbrome. Metribuzin, terbacil, and hexazinone either did not control the foxtail barley or caused unacceptable injury.

Big Sagebrush

Herbimax and X-77 in water were evaluated as substitutes for oil with 2,4-D butyl ester applied at 2.0 lb ai/A at two locations in Wyoming. At one location, no difference in control was seen from oil or water as a carrier or Herbimax or X-77 as additives. Results from the other location demonstrated that X-77 was more effective than Herbimax, with X-77 in water as effective as oil.

Meadow Deathcamas

Phenoxy, picolinic, benzoics and combinations of these herbicides were evaluated for control of meadow deathcamas in meadows. No treatment was highly effective, but 70% control was achieved with 2,4-D LV ester at 4.0 and 6.0 lb ai/A, picloram at 2.0 lb ai/A and picloram + 2,4-D amine at 2.0 and 4.0 lb ai/A.

Canada Thistle

DPX-4189, Dowco 290, Dowco 290/2,4-D (M-3785), and picloram gave 100% Canada thistle control in a crested wheatgrass pasture. Grass injury was observed with picloram applied at 2.0 lb ai/A and DPX-4189 at rates above 0.5 lb ai/A.

Caraway

Caraway, a perennial herb which is becoming a serious problem in many meadowlands, was effectively controlled with 2,4-D LVE at 2.0 and 4.0 lb ai/A and picloram at 0.5 lb ai/A.

Rush Skeletonweed (four papers)

Results from a three-year study at three sites in Boise County, Idaho, demonstrated that application of picloram 2% beads, picloram 22K, and dichlorprop increased dry forage yield and the largest increase was two years after treatment. Dicamba did not alter dry forage yield and 2,4-D amine resulted in a yield increase three years after treatment.

Several hormone-type herbicides were evaluated on bud, flower and seed development. The number of seeds per plant was most significantly reduced with application of 2,4-D plus dicamba.

From a greenhouse study, 2,4-D SULV, applied at 0.56 and 0.84 kg/ha, DPX-4189 at 0.14 kg/ha, and 2,4-D amine at 0.84 kg/ha reduced root and foliage weights of rush skeletonweed.

Puccina chondrillina, a biological control agent for rush skeletonweed, was evaluated when applied by an aerial application taken fifteen minutes, one hour, and twelve hours after release. After twelve hours, approximately 1600 spores/cm^2 were reaching ground level. It was determined that wind currents can influence the direction and flight of the rust spores.

Crupina

Glyphosate, dicamba, picloram and picloram + 2,4-D effectively controlled crupina on rangeland, while DPX-4189 gave poor control.

Spotted Knapweed

Picloram 22K, applied at 0.56 and 1.12 kg/ha, provided 100% spotted knapweed control and gave the highest grass yield. Generally, all picloram formulations resulted in similar forage grass yields. Dichlorprop did not increase forage yield over the control.

Western Needlegrass and Squirreltail (two papers)

Seven herbicides were evaluated in a Jeffery pine and white fir reforestation plantation in Plumas County, California. Hexazinone applied at 2.0 and 4.0 lb ai/A, provided the best control. Conifer survival was not reduced by any of the herbicide treatments.

Foxtail barley control in a tall wheatgrass pasture. Alley, H. P. and N. E. Humburg. Foxtail barley infestations in irrigated pastures and meadows are a serious problem in many of the intermountain grass hay production areas. Whether the infestation is a result of poorly drained soils, salty soil conditions, or poor stands of competing forages there is interest in selective herbicide control. Limited research data are available as to the desirable grass tolerances, rates of herbicides which can selectively be utilized, and the longevity of control without correcting the situation conducive to foxtail barley infestations.

The experimental site was a flood-irrigated tall wheatgrass pasture heavily infested with foxtail barley. Treatments were made May 7, 1979, when the tall wheatgrass was 4 to 5 inches tall and the foxtail barley had 2 to 3-inch leaf growth. Plots were 18 by 45 ft, with two replications. All herbicides were applied with a 6-nozzle knapsack unit which delivered 40 gpa water as a carrier.

Percent foxtail barley control and tall wheatgrass tolerance ratings were made July 27, 1979, and August 19, 1980. At the early evaluation, approximately three months following treatment, metribuzin and hexazinone at the 0.5 lb ai/A rate reduced the stand of foxtail barley by 80%. The low rates of pronamide showed little activity at the early evaluation date. However, one year following treatment, pronamide was the most effective of the herbicides applied, resulting in 80 to 95% reduction in foxtail barley without any apparent reduction in the stand of tall wheatgrass. Tall wheatgrass appears to be tolerant to both pronamide and hexazinone at the rates giving good foxtail barley control. The low solubility of pronamide may dictate fall applications. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1059).

Foxtail barley control in a tall wheatgrass pasture

Herbicides[1]	Rate lb ai/A	Percent Control[2] July 1979	Percent Control[2] August 1980
pronamide	0.25	0	80
pronamide	0.5	30	85
pronamide	1.0	60	95
metribuzin	0.25	0	0
metribuzin	0.5	80	50
hexazinone	0.25	0	80
hexazinone	0.5	80	100
terbacil	0.25	0	60
terbacil	0.5	0	60

[1]Treated May 7, 1979.
[2]Visual evaluations July 27, 1979 and August 19, 1980.

Evaluation of oil versus water as carriers, and Herbimax versus X-77 as additives for control of mountain big sagebrush. Alley, H. P., T. K. Schwartz and N. E. Humburg. Diesel fuel has been recommended and utilized as a carrier for 2,4-D in the chemical sagebrush control programs. With the cost and scarcity of oil, interest in the use of water as a carrier and/or the possibility of using Herbimax or wetting agents with the water to replace oil has been expressed. Herbimax is an oil, surfactant, adjuvant blend which includes 80% petroleum hydrocarbons, 16% surfactant blend and 4% formulation aid and is recommended at 1 qt/A in water as a carrier.

This research was initiated to evaluate the effectiveness of Herbimax and X-77 in water as compared to diesel oil as a carrier for 2,4-D. Two heavily infested sagebrush areas were selected for study sites. Plots ranged from 5 to 125 acres in size with the treatments being applied by fixed wing aircraft. Treatments were made when the sagebrush was considered to be most susceptible to the chemical treatments.

Percentage sagebrush control was determined by actual sagebrush counts in the respective treated areas approximately one year following application.

Data obtained from the Carbon County plots show no apparent differences in percentage sagebrush control resulting from oil or water as a carrier or Herbimax or X-77 as additives. All treatments gave 96% or better control. The response was different on the Natrona County site in that the wetting agent, X-77, was more effective than Herbimax, with the X-77 in water as a carrier being as effective as oil as a carrier. The cost of using X-77 would be approximately 36 cents/A whereas Herbimax would be $2.45/A. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1061).

Sagebrush Control - Carbon County[1]

Treatment and Carrier	Rate and Volume/A	Percent Control
Butyl ester/oil	2 lb/2 gal	96
Butyl ester/water	2 lb/2 gal	97
Butyl ester/water	2 lb/4 gal	99
Butyl ester/water/Herbimax	2 lb/2 gal/1 qt	100
Butyl ester/water/Herbimax	2 lb/4 gal/1 qt	96
Butyl ester/water/X-77	2 lb/2 gal/0.66% v/v	97
	Natrona County[2]	
Butyl ester/oil	2 lb/2 gal	97
Butyl ester/water/X-77	2 lb/2 gal/0.66% v/v	98
Butyl ester/water/X-77	2 lb/4 gal/0.66% v/v	95
Butyl ester/water/Herbimax	2 lb/2 gal/1 qt	86
Butyl ester/water/Herbimax	2 lb/4 gal/1 qt	85
LV ester/water/Herbimax	2 lb/2 gal/1 qt	90

[1]Treatments applied June 15, 1979; evaluated May 30, 1980.
[2]Treatments applied June 29, 1979; evaluated May 28, 1980.

Foxtail barley control in a Regar meadowbrome pasture. Alley, H. P., R. E. Vore and N. E. Humburg. Plots were established in an improved, Big Squirt irrigated, pasture to evaluate the effectiveness of pronamide, metribuzin, terbacil and hexazinone for selective control of foxtail barley in a Regar meadowbrome pasture.

Treatments were applied October 25, 1979, to an irrigated pasture which had been grazed with the clumps of foxtail barley being 3 to 4 inches in diameter. All treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 40 gpa water carrier. Plots were 9 by 30 ft with two replications. Soil on the experimental site was classified as a sandy loam (65.2% sand, 19.2% silt, 15.6% clay, 5% organic matter, with a 8.2 pH).

Visual control and grass damage evaluations were made June 30, 1980. The stand of foxtail barley was somewhat sparse and it was difficult to access the true control potentials of the various treatments. However, pronamide at 0.5 lb ai/A gave excellent control of the foxtail barley clumps without apparent reduction in Regar meadowbrome stand. Metribuzin and hexazinone did not control the foxtail barley clumps or damage the desirable grass to such an extent their value as a potential treatment would be limited. Terbacil at 0.5 lb ai/A gave fair control but caused considerable damage to the meadowbrome. (Wyoming Agric. Exp. Sta., Laramie, 82071, SR 1058).

Foxtail barley control in Regar meadowbrome pasture

Treatments[1]	Rate lb ai/A	Observations[2]
pronamide	0.25	Did not take out clumps of foxtail barley
pronamide	0.5	Excellent control - no grass damage
pronamide	0.75	Excellent control - thinned grass
metribuzin	0.25	Did not take out clumps of foxtail barley
metribuzin	0.5	Did not take out clumps of foxtail barley
hexazinone	0.25	Took out foxtail barley and meadowbrome
hexazinone	0.5	Bare ground
terbacil	0.25	Did not take out clumps of foxtail barley
terbacil	0.5	Fair control - some grass damage

[1]Treated October 25, 1979.
[2]Visual evaluation June 30, 1980.

Evaluation of herbicides for control of meadow deathcamas. Alley, H. P., R. E. Vore and N. E. Humburg. Meadow deathcamas (Zigadenus venenosus) is an apparent contaminant of grassy meadows in many of the western states; however, until recently it has not been reported or concern expressed over infestations in Wyoming. Where the infestation is common it has invaded and makes up a large percentage of the production. The plant does not possess the toxic properties of some of the other Zigadenus species so its presence is predominantly one of lowering forage production and quality.

A timing series was established in 1979 to evaluate the phenoxy, picolinic, benzoics and combinations of these herbicides for control of meadow deathcamas. Plots were established on June 4, July 2 and September 13, 1979. These dates correspond to meadow deathcamas being 6 to 8 inches tall, in full bloom, and after harvest with little or no foliage present. Visual evaluations to determine herbicide effectiveness were made June 30, 1979, approximately one year following treatment.

The most effective treatments were 2,4-D LV ester at 4.0 and 6.0 lb ai/A applied at the 6 to 8-inch stage of growth, picloram at 2.0 lb ai/A and picloram + 2,4-D amine at 2.0 + 4.0 lb ai/A applied at the full bloom stage of growth. These treatments gave only a 70% reduction in stand and could not be considered highly effective. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1065).

Meadow deathcamas control

Herbicide	Rate lb ai/A	Percent Control[1]		
		June 4	July 2	Sept 13
2,4-D LV ester	2.0	50	0	0
2,4-D LV ester	4.0	70	0	0
2,4-D LV ester	6.0	70	0	0
picloram	1.0	50	60	40
picloram	2.0	50	70	40
picloram + 2,4-D amine	1.0 + 2.0	50	60	40
picloram + 2,4-D amine	2.0 + 4.0	50	70	40
dicamba	1.0	0	0	0
dicamba	2.0	0	0	0
Dowco 290 (M 3972)	1.0	0	0	0
Dowco 290 (M 3972)	2.0	0	0	0
dicamba + 2,4-D amine	1.0 + 3.0	40	0	0
2,4,5-T LV ester	1.0	40	0	0
2,4,5-T LV ester	2.0	40	0	0

[1]Treated June 4, July 2 and September 13, 1979. Control corresponds to treatment dates. Visual evaluations June 30, 1980.

Canada thistle control in crested wheatgrass pasture. Alley, H. P. and N. E. Humburg. Plots were established to compare the effectiveness of DPX 4189, tebuthiuron, Dowco 290 (M 3972) and the combination of Dowco 290/2,4-D amine (M 3785) for their effectiveness in reducing the stand of Canada thistle in a crested wheat pasture, to picolinic acid. At time of herbicide application, August 6, 1979, the Canada thistle was in full bloom and growing under extreme drought conditions.

Plots were one block per treatment, 9 by 60 ft in size. Each treatment, except the tebuthiuron 20P, was applied in 40 gpa water carrier. The soil was classified as a loam (45.0% sand, 33.2% silt, 21.8% clay, 4.4% organic matter with 7.3 pH).

Visual evaluations for top growth control were made on August 2, 1980. The treatments of DPX 4189, Dowco 290 (M 3972) and the combination of Dowco 290/2,4-D amine (M 3785) gave 100% control of the Canada thistle infestation. DPX 4189 at the 0.25 and 0.5 lb ai/A rate, Dowco 290 (M 3972) at 1.0 and 2.0 lb ai/A along with the combination of Dowco 290/2,4-D amine (M 3785) did not result in any grass damage. Picloram applied at the 2 lb ai/A rate took out 50% of the crested wheatgrass. (Wyoming Agric. Exp. Sta., Laramie WY 82071, SR 1057).

Herbicides, Canada thistle shoot control

Herbicides[1]	Rate lb ai/A	Percent Control	Observations[2]
DPX 4189	0.25	100	Grass okay
DPX 4189	0.5	100	" "
DPX 4189	1.0	100	30% grass reduction
DPX 4189	2.0	100	50% grass reduction
tebuthiuron	1.0	0	Thistle yellow - took out grass
tebuthiuron	2.0	50	Thistle yellow - area bare
tebuthiuron	4.0	80	Bare ground
Dowco 290 (M 3972)	1.0	100	Grass okay
Dowco 290 (M 3972)	2.0	100	" "
Dowco 290/2,4-D (M 3785)	0.5 + 2.0	100	Grass okay
Dowco 290/2,4-D (M 3785)	1.0 + 4.0	100	" "
picloram	2.0	100	50% grass reduction

[1]Herbicides applied August 6, 1979.
[2]Visual evaluations made August 2, 1980.

Caraway control in flood irrigated meadow. Alley, H. P., R. E. Vore and N. E. Humburg. Caraway (*Carum carvi* L.) a perennial herb is becoming a serious problem in many meadowlands. Surveys and inquiries for control measures indicate its spread and increased importance.

Chemical control evaluation plots were established July 6, 1978, when the caraway was full bloom, 1 to 2 ft tall. The soil at the experimental site was classified as a sandy loam (62.8% sand, 31.6% silt, and 5.6% clay) with 7.0% organic matter and a pH of 6.2. The treatments were applied with a 6-nozzle knapsack calibrated to deliver 40 gpa water carrier.

Visual control evaluations were made August 14, 1978; June 4, 1979, and June 6, 1980, approximately 1 month, 1 year and 2 years after treatment. The treatments of 2,4-D LVE at 2.0 and 4.0 lb ai/A and picloram at 0.5 lb ai/A and above resulted in the most rapid activity and also maintained excellent control over the two-year period. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1060).

Caraway control one and two years following treatment

Herbicide[1]	Rate lb ai/A	Percent Control[2] Aug. 14 1978	June 4 1979	June 6 1980	Observations
2,4-D LV ester	2.0	100	90	90	Grass OK
2,4-D LV ester	4.0	98	99	100	" "
2,4-D LV ester	6.0	100	90	50	" "
picloram/ 2,4-D amine	0.125 + 0.25	50	50	50	Grass OK
picloram/ 2,4-D amine	0.25 + 0.5	40	75	50	" "
picloram	0.25	40	60	60	Grass OK
picloram	0.5	85	99	100	" "
picloram	1.0	100	99	100	Grass prostrate
dicamba	0.5	10	0	0	Grass OK
dicamba	1.0	10	0	0	" "
dicamba/ 2,4-D amine	0.25 + 0.75	10	0	0	Grass OK
dicamba/ 2,4-D amine	0.5 + 1.5	70	30	0	" "

[1]Herbicides applied July 6, 1978.
[2]Visual top growth control evaluations.

Influence of registered herbicides on dry forage yield on rangeland infested with rush skeletonweed. Cheney, T. M., G. A. Lee and D. C. Thill. An experiment was established at three sites in Boise County, Idaho to evaluate the effect of registered herbicides on control of rush skeletonweed (*Chondrilla juncea* L.) in rangeland. Treatments were applied in the spring of 1977, 1978, and 1979 when the plants were in the rosette stage. Herbicides were applied with a knapsack sprayer equipped with 8004 teejet nozzles and calibrated to deliver 378.5 l/ha at 2.8 kg/cm^2. The design was a randomized complete block with three replications. Dry forage yield was evaluated in the spring of 1980.

Yield was highest two years after application of picloram 2% beads and picloram 22K. Application of 2,4-D amine resulted in a yield increase 3 years after application date. Application of dicamba did not alter dry forage yield. Applications of picloram 2% beads, picloram 22K, and dichlorprop increased dry forage yield and the largest increase was two years after application. (University of Idaho Agricultural Experiment Station, Moscow, Idaho, 83843).

Influence of registered herbicides on dry forage yield on rangeland infested with rush skeletonweed.

Treatment	Rate kg/ha	Dry Forage Yield kg/ha 1977	1978	1979
picloram 2% beads	.56	454.53 a[1]	828.83 ab	124.77 bc
picloram 22K	.56	173.79 a	955.84 ab	124.64 bc
dichlorprop	1.12	222.80 a	124.53 e	130.35 bc
dicamba	2.24	298.56 a	267.37 b-e	280.73 a-c
2,4-D amine	2.24	106.95 a	33.42 c-e	164.51 bc
check	0	204.98 a	127.67 c-e	102.49 c

[1] Means followed by the same letter within a column are not significantly different at the 5% level by Duncan's mean separation.

Effect of low volume hormone herbicides on bud, flower and seed development of rush skeletonweed. Cheney, T. M., G. A. Lee and D. C. Thill. A study was established in Ola, Idaho to evaluate the effect of hormone-type herbicides on bud, flower and seed development of rush skeletonweed (Chondrilla juncea L.). Herbicides were applied July 16, 1980 using a knapsack sprayer equipped with a three nozzle boom with 80067 teejet nozzles. The sprayer was calibrated to deliver 378.5 l/ha. The plots were randomized in a complete block design with three replications. Air temperature at the time of application was 27 C with a relative humidity of 48%. The sky was clear with a slight wind of 6 kmph. The site was established on rangeland with rush skeletonweed the predominant specie. Also present was bulbous bluegrass (Poa bulbosa L.) and medusahead (Taeniatheum asperum Simonkai). Soil was sandy with medium trash cover. Evaluations on number of buds, number of flowers and number of seeds was taken two, three and four weeks after application respectively.

Evaluations of number of buds present after application showed no significant decrease from the check with all treatments. The number of flowers per plant was significantly reduced with application of all herbicides except 2,4-D plus dicamba at .28 and .14 kg/ha respectively. The number of seeds per plant was most significantly reduced with applications of 2,4-D plus dicamba at rates of .28 kg/ha of 2,4-D plus .07 and .14 kg/ha of dicamba. Complete seed suppression was also observed with applications of picloram at .07 and .14 kg/ha and 2,4-D plus picloram at .14 kg/ha 2,4-D plus .07 and .14 kg/ha picloram. (University of Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Effect of low volume hormone herbicides on bud, flower and seed development of rush skeletonweed

Treatment	Rate kg/ha	# of Buds preplant	# of Flowers per plant	# of Seeds per plant
2,4-D LVE	.14	58.8a[1/]	2.8b	15.0a
2,4-D LVE	.28	47.0a	2.3b	8.0b
dicamba	.07	40.0a	.4b	15.0a
dicamba	.14	42.3a	.3b	1.3d
2,4-D + dicamba	.14 + .07	47.4a	1.3b	3.3cd
2,4-D + dicamba	.14 + .14	57.4a	1.9b	1.0d
2,4-D + dicamba	.28 + .07	61.1a	12.3a	0d
2,4-D + dicamba	.28 + .14	38.8a	.6b	0d
picloram	.07	49.6a	.3b	0d
picloram	.14	52.5a	.6b	0d
2,4-D + picloram	.14 + .07	52.7a	0b	0d
2,4-D + picloram	.14 + .14	43.3a	.6b	0d
2,4-D + picloram	.28 + .07	52.4a	.2b	6.3bc
2,4-D + picloram	.28 + .07	57.9a	.9b	0d
2,4-D SULV	.14	75.2a	6.1b	11.0ab
2,4-D SULV	.28	48.3a	2.7b	14.0a
check	-0-	49.6a	1.9b	9.0b

1 Means followed by the same letter are not significantly different at the .05 level by Duncans Mean Separation.

Effect of registered, candidate and experimental herbicides on the control of rush skeletonweed. Cheney, T. M., G. A. Lee, R. J. Mink and D. C. Thill. A greenhouse study was established at Moscow Idaho to evaluate the effect of registered, candidate, and experimental herbicides on the weights of roots and aerial portions of rush skeletonweed (*Chondrilla juncea* L.). Plants were started in 10 cm pots of standard greenhouse mix soil on December 12, 1979. The herbicides were applied to 12.7 cm diameter rosettes with a knapsack sprayer equipped with 8004 teejet nozzles calibrated to deliver 378.5 l/ha. The equipment was randomized in a complete block design. Root and foliage rates were taken three weeks after treatment.

Foliage and root weights were reduced significantly with the application of 2,4-D SULV at .84 kg/ha. Application of 2,4-D SULV at 0.56 kg/ha significantly reduced foliage and root percent of check. Application of DPX-4189 at .14 kg/ha resulted in slight reduction of foliage and root weights. 2,4-D amine at .84 kg/ha also significantly reduced root and foliage weights.

Effect of registered, candidate and experimental herbicides on the control of rush skeletonweed.

Treatment	Rate kg/ha	Foliage Wt. grams	Root Wt. grams	% of Check Foliage	% of Check Root
check	-0-	17.45a[1/]	12.43a	100.0a	100.0a
DPX-4189	.035	13.94ab	8.53b	80.02ab	68.91b
DPX-4189	.07	14.36ab	7.81b	83.22ab	62.48b
DPX-4189	.14	11.95b	6.29bc	71.68b	50.83b
2,4-D SULV	.56	.96c	5.43b-d	5.04c	45.11bc
2,4-D SULV	.84	0c	2.35d	0c	20.41c
2,4-D amine	.84	0c	2.82d	0c	23.25c

1/ Means followed by the same letter are not significantly different at the .05 level by Duncan's Mean Separation.

Effect of herbicides on the control of *Crupina vulgaris* in rangelands. Miller, T. L., D. C. Thill, D. L. Kambitsch and G. A. Lee. Common crupina (*Crupina vulgaris*) is a member of the sunflower or Asteraceae family. Common crupina currently infests approximately 9,200 ha of rangeland in Idaho and has the potential to spread into adjacent states. An experiment to examine the efficacy of herbicides applied alone and in combinations on common crupina was established on April 29, 1980 near Orofino, Idaho. Liquid formulations were applied with a knapsack sprayer equipped with a three nozzle boom. The sprayer was calibrated to deliver 378.5 l of water carrier per ha. Granular formulations were applied by hand to the soil surface. The square rod plots were arranged in a randomized complete block design and treatments were replicated four times.

Percent common crupina control was determined by visual evaluations on July 28, 1980 approximately three months after herbicide application. All herbicide treatments significantly reduced common crupina stands compared to the untreated control. Seven of the 15 treatments gave 100% control of common crupina. These include glyphosate at 1.12 and 2.24 kg/ha, dicamba at 1.12 and 2.24 kg/ha, picloram (22K) at 0.28 and 0.14 kg/ha, and picloram (22K) + 2,4-D amine at 0.14 + 1.12 and 0.28 + 1.12 kg/ha. Four treatments reduced common crupina stands by 80% or better. These were 2,4-D amine at 4.48 kg/ha, picloram (2% pellets) at 0.28 and 0.56 kg/ha, and picloram (22K) + 2,4-D amine at 0.14 + 1.12 kg/ha. Three treatments gave poor control of common crupina, these were 2,4-D amine at 1.12 kg/ha, DPX-4189 at 0.07 and 0.14 kg/ha rates. The poor performance of the 2,4-D amine at 1.12 kg/ha was due in part to the lateness of the application. Also the excessive amounts of rainfall which occurred during the summer months allowed common crupina to recover from this treatment. The picloram granular formulations exhibited reduced control compared to the picloram liquid formulations. This difference was due to the inefficiency of obtaining a uniform coverage of the granuals by hand application, although it was not significant using Duncan's multiple range test. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843).

Visual evaluation of percent control of <u>Crupina vulgaris</u> at Orofino, Idaho.

Treatment[2]	Rate kg (ai)/ha	Percent control[3]
check	0.0	0 c
glyphosate	1.12	100 a
glyphosate	2.24	100 a
2,4-D amine	1.12	25 b
2,4-D amine	4.48	81.25 a
dicamba	1.12	100 a
dicamba	2.24	100 a
picloram (22k)	.28	100 a
picloram (22k)	0.14	100 a
picloram (2% pellets)	0.28	80 a
picloram (2% pellets)	.56	86.25 a
picloram + 2,4-D amine	0.14 + 1.12	87.5 a
picloram + 2,4-D amine	.28 + 1.10	100 a
DPX-4189	0.07	32.5 b
DPX-4189	0.14	32.5 b

[1] Evaluations made on July 28, 1980

[2] Application date was April 29, 1980

[3] Means followed by like letters are not significant at the 5% level of probability according to Duncan's multiple range test.

Effects of herbicides on spotted knapweed and forage yields 2 years after treatment. Lish, J. M. and D. C. Thill. An experiment was conducted on old pasture in Bonner County to evaluate the performance of herbicidal formulations on spotted knapweed (Centaureau maculosa Lam.). Herbicides were applied on May 18, 1978, to 2.7 X 9.1 m plots. Spotted knapweed density averaged 313 plants/m^2. Liquid formulations were applied in 151.5 l of water with a backpack plot sprayer equipped with three S.S. 8004 nozzles. The dry formulations were applied with a hand-held granular applicator. The experiment was in a randomized complete block design with three replications. Weed and forage dry weights were taken on July 15, 1980.

All applications except dichlorprop increased forage grass yield over the control. Spotted knapweed control was 100 percent and grass yield was highest with picloram 22K at 0.56 and 1.12 kg/ha. Dry picloram formulations at 1.12 kg/ha and picloram 22K at 0.56 and 1.12 kg/ha eliminated hairy vetch (Vicia villosa), although hairy vetch yields of all treatments were not significantly different from the control. Generally, all picloram formulations resulted in similar forage grass yields. Dicamba + 2,4-D at 1.12 + 3.37 kg/ha resulted in the greatest spotted knapweed control of the 2,4-D or dicamba treatments. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

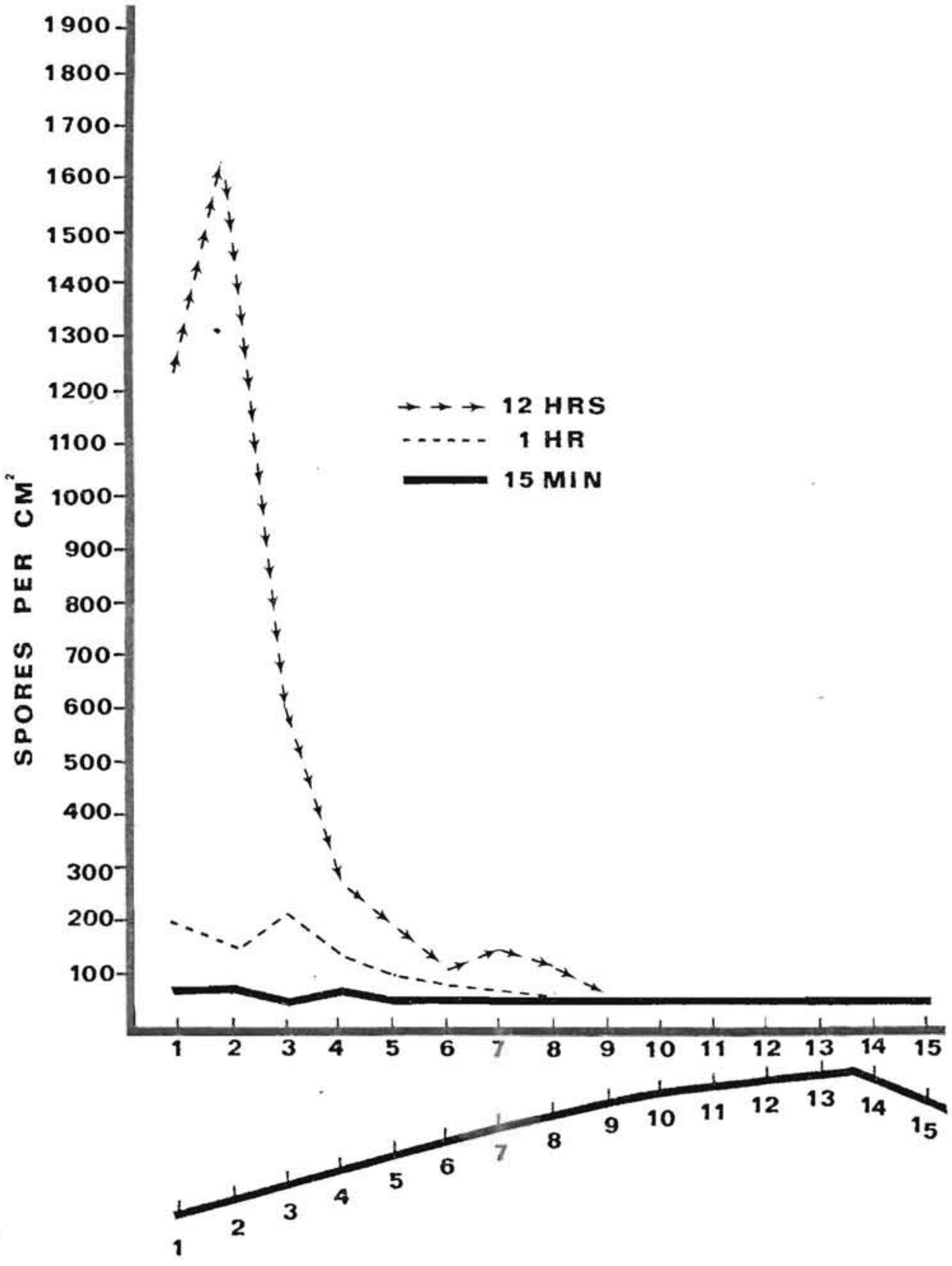
Dry weight yield of spotted knapweed, forage grasses, and hairy vetch 2 years after herbicide application.

Treatment	Rate	Yield: Spotted knapweed	Yield: Forage grasses	Yield: Hairy vetch
	(kg ai/ha)	(kg/ha)		
control	-	2345a*	118i	193ab
picloram 2% pellets	0.28	2960a	718f-h	111ab
picloram 2% pellets	0.56	1133b	1156c-g	19b
picloram 2% pellets	1.12	740b	1049d-g	0b
picloram 2% beads	0.28	1052b	846f-h	53ab
picloram 2% beads	0.56	678b	1306b-f	10b
picloram 2% beads	1.12	196b	1413b-f	0b
picloram 5% pellets	0.28	2408a	1028d-g	19b
picloram 5% pellets	0.56	874b	931e-g	48ab
picloram 5% pellets	1.12	900b	1628a-e	0b
picloram 22K	0.28	143b	1349b-f	44ab
picloram 22K	0.56	0b	1885ab	0b
picloram 22K	1.12	0b	2120a	0b
picloram 212	0.28	927b	1178b-g	48ab
picloram 212	0.56	205b	1713a-d	145ab
picloram 212	1.12	0b	1585a-e	39ab
2,4-D amine	1.12	874b	814f-h	870ab
2,4-D amine	2.24	945b	1349b-f	102ab
dichlorprop	1.12	2889a	214hi	73ab
dichlorprop	2.24	2425a	492g-i	184ab
dicamba	2.24	339b	1242b-f	68ab
dicamba	4.49	1204b	1778a-c	19b
dicamba + 2,4-D	0.56 + 1.69	660b	1274b-f	126ab
dicamba + 2,4-D	1.12 + 3.37	18b	1156e-g	251a

*Means within a column followed by the same letter(s) are not significantly different at the 5% level by Duncans multiple range test.

Dispersal of a rust from fixed winged aircraft. Cheney, T. M., G. A. Lee, D. C. Thill. A study was initiated in Ola, Idaho on September 5 to evaluate an aerial application method of spore dissemination of a rust, *Puccinia chondrillina*, used as a biological control agent for rush skeletonweed, *Chondrilla juncea*. Spore traps were placed 45.72 cm above ground level at 1.53 m intervals perpendicular to a ridge running north and south. There were 45 traps with every three traps representing one location a total of 15 locations. The line of spore traps ran 9.14 m down the east slope and approximately 121.92 m down the west slope. A total of 70 gms of spores were mixed in a light talc powder and distributed over 100/ha treated. Spores were released over the entire area from a four passenger fixed wing aircraft flying 319 kph at a height of 9.14 m. Spores were released over the study area by flying perpendicular to the trap line at the aforementioned speed and height. Traps at each location were collected 15 min, 1 hr and 12 hr after release and spores/cm^2 were determined.

Counts taken 15 minutes after release show a negligible amount of spores reaching the ground. By one hour the amount reaching the ground had doubled and 12 hours after release approximately 1600 spores/cm^2 were reaching ground level. Air movement in the evening at this location was downslope to the west. This coincides with the amount of spores captured downslope from the release path. Therefore care should be taken when releasing spores from the air when infection of specific target areas are critical. Time of day and subsequent wind currents can influence the direction and flight of rust spores. (University of Idaho Agricultural Experiment Station, Moscow, Idaho 83843)



Dispersal of a rust from fixed winged aircraft

Control of perennial grasses in a reforestation plantation. McHenry, W.B., L. Lindstrand, T.E. Robson and N.L. Smith. A site in Plumas county California at 4,000 ft. elevation was selected to measure the efficacy of soil active herbicides for the control of western needlegrass and squirreltail and the tolerance of 1-0 conifers. One half of each 20 by 40 ft. plot was cultivated with tractor-mounted brush disk prior to tree planting and treatment application.

Herbicides were applied on November 2, 1978 and spring, May 23, 1979 utilizing a carbon dioxide sprayer calibrated to deliver 20 gpa. Herbicide treatments included 2 and 4 lb ai/A of atrazine, simazine, pronamide, norflurazon, 1, 2 and 4 lb ai/A hexazinone and 1 lb ai/A of fluridone. Jeffery pine and white fir were planted immediately prior to the spring herbicide application. Six trees of each species were planted in both the cultivating and uncultivated plots.

Evalation of tree survival and grass control was made September 15, 1980. Grass control was superior on the disturbed plots regardless of application season and fall applications were superior on both disturbed and undisturbed plots. Conifer survival was not reduced by any of the herbicide treatments nor did grass control at any level improve survival over the untreated controls. (University of California Cooperative Extension, Davis, CA 95616).

Comparison of seven herbicides for perennial grass control on replanted forestland. McHenry, W.B., L. Lindstrom and N.L. Smith. Grasses compete with young confiers for nutrients and moisture and often attract gophers. A site in Plumas County, Ca. was selected to evaluate soil-active and foliage-applied translocated herbicides for the control of squirreltail and western needlegrass. Herbicides were applied preplant utilizing a carbon dioxide pressurized backpack sprayer calibrated to deliver 30 gpa on May 22, 1979 to 20 ft. by 25 ft. plots, half of which was disked. Atrazine, simazine and hexazinone (2 and 4 lb. ai/A) pronamide, amitrole and glyphosate (1 and 2 lb. ai/A) and dalapon (5 and 10 lb. ai/A) were evaluated. Surfactant (X-77) @ 0.5% v/v was included with amitrole and dalapon applications. A uniform stand of squirreltail and needlegrass was growing on the undisturbed plots, however the cultivation had reduced stand on the disturbed plots. White fir and jiffrey pine were planted immediately following the spraying operation placing 12 1-0 trees in each plot.

Grass response evaluations were made July 30, 1979 and Sept. 15, 1980. Hexazinone (2 and 4 lb. ai/A) provided 90% or better grass control on both cultivated and non-cultivated plots with no reduction in conifer survival. Atrazine, simazine, and pronamide were somewhat less effective. Dalapon (10 lb ai/A) exhibited 96% control on the undisturbed side but 30% on the cultivated area indicating reestablishment from seed or buried plants. Amitrole and glyphosate were less effective for control of the grasses. (University of California Cooperative Extension, Davis, CA 95616).

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Project 3: UNDESIRABLE WOODY PLANTS

Roy R. Johnson, Project Chairman

SUMMARY

A study on a watershed in Arizona indicated that less than 1% of the tebuthiuron applied as a spot treatment to watershed chapparrel left the treated area in stream water, and that most of this herbicide entered the stream water in heavy storm flow in a three week period immediately following application. No tebuthiuron was detected in stream flow during the second winter season after application.

Picloram was the most effective of five soil-applied herbicides for control of New Mexico locust, but was ineffective on Gambel oak. A mixture of picloram and tebuthiuron may be effective for control of both species.

Broom snakeweed was controlled most effectively in New Mexico by foliar applications of picloram or picloram plus 2,4,5-T.

Foliar sprays of 2,4-D ester plus oil, trichlopyr ester, picloram, 2,4-D + dichlorprop or 2,4-D + trichlopyr controlled chamise in spring applications in California. Glyphosate was more effective when applied in June than in March.

Scotch broom was controlled in California by June applications of glyphosate, trichlopyr amine or picloram. Picloram was also effective when applied in the fall.

Deerbrush control on forest sites was studied in California. Foliar sprays of 2,4-D, 2,4,5-T, trichlopyr, glyphosate or fosamine gave 90 to 100% control from a May application. A fall application of hexazinone showed ponderosa pine tolerance. Spring applications of hexazinone and glyphosate provided deerbrush control and pine tolerance when applied in March.

<u>Tebuthiuron residues in stream water from a spot-treated chaparral watershed in Arizona</u>. Davis, E. A. Water yield from chaparral watersheds in Arizona can be increased by replacing deep-rooted brush with more shallow-rooted grasses. Brush control chemicals are necessary for a permanent conversion from the vigorously sprouting shrubs to grass. The suitability of chemicals for watershed use depends on many factors in addition to their effectiveness in controlling brush; they should not adversely affect the products of streams, lakes, and reservoirs, or subsequently irrigated crops; and they should be harmless to wildlife, livestock, and humans.

This study was conducted in conjunction with a spot-treatment application of tebuthiuron on a 46.5-acre chaparral watershed (3-Bar B) to determine the effects of a brush-to-grass conversion on water yield. The objectives of the residue phase of the study were to determine the concentration and duration of tebuthiuron residues in streamflow from the watershed, to estimate the total loss of tebuthiuron in stream water, and to determine whether downstream residues were detectable following dilution by the creek into which the watershed stream flowed.

The treatment prescription specified a selective spot treatment hand application of tebuthiuron pellets on the northeast-facing slopes (18.5 acres) of the watershed. These areas had been treated with fenuron 10 years previously, but a residual shrub cover of 19.1% remained. Tebuthiuron pellets containing 20% active ingredient were scattered beneath shrubs at the application rate of 4 lb ai/A. The total amount of tebuthiuron pellets applied was 71.7 lb (14.3 lb ai). Since overall brush cover on the treated slopes was 19.1%, the area actually treated was only 3.5 acres. Therefore, the average application rate on the ground actually treated was 4.1 lb ai/A, whereas the overall application rate on the treated slopes (18.5 acres) was 0.78 lb ai/A. The treatment was applied on February 15 and 16, 1978.

Water samples were collected at the gaging station at the outlet of the watershed and from two springs that drained from a treated area within the watershed. Routine weekly samples were taken from streamflow at the gaging station. More frequent samples were collected during periods of heavy or prolonged rain. Except for rare periods during and following heavy rain storms, streamflow over the weir originated from flow that was entirely within the channel alluvium until it was forced to the surface by bedrock immediately upstream from the weir. Water samples from the springs were of particular interest because more than half the total amount of tebuthiuron was applied on the slope from which the springs drained. During stormflow periods, when the chance for tebuthiuron residues was greatest, samples were also taken from the main creek into which the stream from the treated watershed flowed.

Water samples were collected in 32-ounce polyethylene bottles and refrigerated at 35 F within two hours. The samples were then stored in deep freeze until analyzed by gas chromatography by Lilly Research Laboratories, Division of Eli Lilly and Company. The lower limit of detection of tebuthiuron residues was 0.01 ppm. Daily precipitation and streamflow volumes were measured.

Eleven days after the watershed was treated there was a series of heavy rainstorms. By the 18th day 10.99 inches of rain had fallen, and a trace of tebuthiuron--less than 0.01 ppm--occurred at the gaging station.

Tebuthiuron was not detected in the spring samples or in the creek into which the watershed stream flowed. None of the samples collected on eleven days during the recession flow period contained detectable tebuthiuron residues. During this period it rained on four days; samples were collected either on the day it rained or on the following day.

The second winter season after treatment was another unusually wet period. It provided ideal conditions for the movement of tebuthiuron from watershed soil into stream water. None of the 79 samples collected at the four sites contained detectable tebuthiuron residues. Sampling lasted for 16 months, during which time rainfall accumulation was 62.18 inches. Samples selected for analysis corresponded as closely as possible with significant rainfall and recession flow periods.

The amount of tebuthiuron that left the watershed in stream water was estimated from daily streamflow volumes and tebuthiuron concentrations. Because the amount of tebuthiuron detected on the 18th day was less than the analytical method can quantitatively determine, the concentration was arbitrarily estimated as 0.005 ppm. Based on this concentration, the estimated amount of tebuthiuron lost in stream water on the 18th day was 6.9 g. To calculate the maximum amount of tebuthiuron that may have been lost in stream water it was assumed that the tebuthiuron concentration during the entire 8-day stormflow period prior to the 18th day was 0.005 ppm. In this "worse possible case" situation the estimated maximum amount of tebuthiuron lost to stream water was 45.5 g or 0.7% of the amount of tebuthiuron applied, all within the first 18 days following the treatment.

The period during which the study was conducted provided excellent conditions for testing the movement of tebuthiuron from watershed soil to stream water. Rainfall during the first two post-treatment winter seasons greatly exceeded the norm. During the 1978 and 1979 water years (October-September) annual weighted rainfall on the watershed was 34.6 inches and 43.3 inches, respectively, whereas mean annual precipitation for the preceding 21 years was 22.6 inches. The 1978 annual precipitation had been exceeded only once in that 21 years, while the precipitation for 1979 was the largest amount received during the 23-year history of observations on the watershed. Conditions favorable for the movement of tebuthiuron from soil to stream water were far greater during the first two post-treatment years than normally occurs at the study area.

Factors favorable to the movement of tebuthiuron into the stream water were the gravelly sandy loam soil with a weathered granite, deeply fractured regolith, rapid soil permeability, low soil organic matter (about 1.7%) confined to the top two inches of soil, steep slopes (20 to 100%), and tebuthiuron's water solubility of 2,300 ppm. Factors that minimized the loss of tebuthiuron in stream water were the low overall application rate on the treated slopes (0.78 lb ai/A), the treatment of only northeast-facing slopes (40% of the watershed), hand application of tebuthiuron pellets as a spot treatment to individual clumps of shrubs, and the application of tebuthiuron only away from channels. (Rocky Mountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Arizona State University, Tempe, Arizona 85281).

Response of New Mexico locust and Gambel oak to picloram pellets. Davis, E. A. and G. J. Gottfried. New Mexico locust occurs as an understory species in conifer forests in the Southwest. It sprouts from the root crown and horizontal roots and forms thickets following timber harvesting and forest clearing operations. The treatment considered most suitable for contolling this sprouting is hand application of a soil herbicide. To control the reinvasion of locust on a clearcut area in a mixed conifer watershed in Arizona, it was necessary to determine the efficacy of soil herbicides to control New Mexico locust. (A soil herbicide recommendation for New Mexico locust was not available at the time). A test on locust sprouts was conducted to provide a treatment prescription. The herbicides tested were: fenuron, karbutilate, bromacil, 2-*sec*-butylamino-4-ethylamino-6-methoxy-*s*-triazine, and picloram. These herbicides are representative of several classes of herbicides, and were reasonable selections at the time the test was conducted; however, only picloram is currently available and registered for range use. Fenuron and picloram were formulated as pellets; the other herbicides were formulated as granules. Each herbicide was applied in July to 30 individual locust clumps by treating a 4-foot square area of ground around each clump. Picloram was applied at the rate of 10 lb ae/A; all other herbicides were tested at 20 lb ai/A. The soil was a clay loam.

Picloram was the only soil herbicide tested that was effective on New Mexico locust. By the end of the first growing season (11 weeks) all but one picloram-treated locust clump was completely defoliated, and 67% of the clumps were top killed. One year after treatment 93% of the clumps were dead, judged on the absence of new sprouts. Picloram was effective at 10 lb/A, whereas fenuron and bromacil, each at 20 lb/A, were only slightly active; karbutilate and the *s*-triazine had little or no effect. Picloram was, therefore, the herbicide of choice for the large-scale watershed treatment.

The large-scale study was conducted in an area where thickets of New Mexico locust and Gambel oak ranging from 3 to 20 feet tall reoccupied about 20 acres of an 80-acre moist site clearcut area on a mixed conifer experimental watershed. Because the water yield effects of the clearcut were under investigation it was desirable to eliminate the transpiratory water loss caused by the locust and oak thickets. Based on the test results the treatment prescription for the invading woody plants on the clearcut area of the watershed was picloram pellets applied by hand at the rate of 6 lb ae/A to patches of New Mexico locust, Gambel oak, and other minor species. The application was made in early May. Treatment effects were evaluated after two growing seasons, when plant response to the picloram application was complete. Precipitation during the 17-month observation period was 52.6 inches.

The picloram application was very effective on New Mexico locust but was ineffective on Gambel oak. Of the 2,341 locust plants examined 86% were dead, whereas of 2,403 Gambel oaks examined only 2% were killed. Blue elder was moderately sensitive (78% dead out of 58); Arizona walnut was moderately resistant (16% dead out of 37). Grasses and forbs were temporarily eliminated from the picloram-treated patches, but grasses generally were well established after two growing seasons. There is no doubt about the effectiveness of the picloram pellet prescription for controlling New Mexico locust regrowth on the cleared forest site.

However, permanent elimination of such a prolific sprouter and seeder is usually difficult with a single application because of delayed recovery of apparently dead plants and because of reinvasion by seedlings from seeds of locust in the surrounding untreated areas. If newly invading plants become a management problem, then maintenance spot treatments might be necessary.

The large-scale study clearly demonstrated the total ineffectiveness of a 6 lb/A picloram application on Gambel oak. Because Gambel oak is sensitive to tebuthiuron pellets, a possible herbicide prescription for sites on which New Mexico locust and Gambel oak are problem species would be a duo-herbicide spot treatment in which picloram pellets are applied on locust, and tebuthiuron pellets are applied on Gambel oak. Both picloram and tebuthiuron are registered for rangeland brush control in Arizona. (Rocky Mountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Arizona State University, Tempe, Arizona 85281).

Effects of picloram and other herbicides on broom snakeweed control in northeastern New Mexico. Dickerson, George W. Broom snakeweed (_Xanthocephalum sarothrae_ and _X. microcephalum_) is often a dominant shrub in various range ecosystems in New Mexico. Though a relatively small shrub, this aggressive perennial can compete heavily for soil moisture and nutrients. It is also often toxic to livestock, and thus there is an increased demand for its control.

In late May and early June of 1979, various herbicides were applied to broom snakeweed at six locations in northeastern New Mexico (Union and Curry counties). The experiment was set up in a randomized block design with six replications, with each location being one replication. Individual treatment plots were ½ acre in size. Topography and soils ranged greatly from site to site.

Herbicides were applied with a boom sprayer mounted on the back of a pickup. Individual treatments were mixed and sprayed out of a 55-gallon drum with a 5-horsepower engine and pump attached to the boom. Approximately 20 gallons of water per acre were applied. Chemicals included 2,4-D (ester), and two rates each of picloram (potassium salt) and picloram (triisopropanoiamine salt) plus 2,4,5-T (propylene glycol butyl ether ester)(Table). Each plot at each location was visually evaluated for top kill (1979) and given a rank of 1 (0% kill) to 6 (100% kill). The six replications were added together for each treatment and a Chi Square analysis was run on the data using Friedman's Procedure (Steele and Torie, 1960, _Prin. and Proc. of Statistics_, p. 403).

Picloram at a rate of 0.5 lb ai/A seemed to give the best control of all treatments, although there were no significant differences (LSD .05) between picloram at a rate of 0.25 lb ai/A or the higher rate of picloram plus 2,4,5-T. There were no significant differences between the lower rate of picloram plus 2,4,5-T, 2,4-D and the check.

In 1980, all the plots in Curry county died of drought, including the checks. In Union county, picloram at 0.5 lb ai/A still showed the best control of all treatments at all locations. (Dept. of Agricultural Services, New Mexico State University, Las Cruces, New Mexico 88003).

Table Effects of various herbicides on top kill of broom snakeweed in northeastern New Mexico, 1979

Chemical	lb ai/A	% Top Kill	Rank[1/]
Picloram	0.50	94.5	34.0 a[2/]
Picloram	0.25	85.0	28.5 ab
Picloram + 2,4,5-T	0.25 + 0.25	75.8	26.5 abc
Picloram + 2,4,5-T	0.125 + 0.125	44.2	16.0 bcd
2,4-D	2.00	26.7	15.0 cd
Check	----	0	6.0 d

1/ Highest numbers in each column represent best top kills (total rank of six replications).

2/ Numbers followed by the same letter in a column are not significantly different (LSD .05).

Control of chamise on California rangeland. McHenry, W.B., F.L. Bell and N.L. Smith. Chamise occupies thousands of acres of California rangeland, markedly reducing grazing capacity and increasing the threat of wildfire. Seven foliage applied translocated herbicides were applied alone and in combination to a range site in Colusa county containing three year old chamise regrowth. Two dates of application were compared. Chamise was in the late bloom stage and soil moisture was low when an application was made June 1, 1978. A second application was made to adjacent plots March 7, 1979, at a pre-bloom stage. Chamise was in a more vigorous growing condition due to a more favorable soil moisture status at the March, 1979 date.

A plot size of 400 sq. ft. containing an average of 14 chamise plants each were used; treatments were replicated 4 times. Herbicides were applied utilizing a carbon dioxide pressurized sprayer calibrated to deliver 20 gpa.

Shrub counts were made August 26, 1980, and control expressed as percent kill was determined from live versus dead plants. Control was superior from the 1979 applications presumably because of higher soil moisture conditions. Control values of 92% to 100% were observed from the 1979 applications of 2,4-D low volatile ester containing either diesel fuel or a parafine base oil (Surfel) at 0.5 gpa, triclopyr low volatule ester 4 lb ae/A , picloram 0.5, and 1 lb ae/A; and combinations of 2,4-D with either dichlorprop 2 plus 2 lb ae/A or triclopyr 2 plus 2 lb ae/A. Glyphosate provided better control applied at the later date in 1978. The addition of surfactant (MON 0810) to the commercial formulation of glyphosate at 1 lb ai/A to equal the concentration found in the 2 lb ai/A rate improved chamise response on both application dates, more particularly on the 1978 date. Dicamba was not particularly promising at 2 and 4 lb ae/A. (University of California Cooperative Extension, Davis, CA 95616).

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Response of scotch broom to five foliage-active herbicides two years following treatment. McHenry, W.B , W.H. Brooks and N.L. Smith. Scotch broom frequently invades range and forest land in the Sierra Nevada and coastal mountains of California often severely limiting grazing and timber production. A coastal site near Fort Bragg was selected to evaluate 2,4-D, 2,4,5-T (low volatile ester), glyphosate, triclopyr (amine), fosamine and picloram for the control of mature broom up to 8 ft. in height. A split plot design was employed with initial applications made June 23, 1977 (broom 10% flower, 90% seed pod) and November 4, 1977 (1% flower, 50% leaf drop). Utilizing a spray volume of 40 gpa, materials were applied to 20 by 20 ft. plots with a carbon dioxide backpack sprayer fitted with a single DOC 21 Spraying Systems nozzle. Four replications were employed. Spring and fall treated plots were retreated June 7 and November 8, 1978.

Evaluations were made May 12, 1980; results indicate that June applications of glyphosate at 2 and 4 lb ai/A, and triclopyr amine at 4 lb ae/A provided over 90% control. Picloram at 0.5 lb ai/A (fall) and 1 lb ai/A (summer and fall)also provided over 90% control. (University of California Cooperative Extension, Davis and Ukiah, CA 95616).

Scotch broom control
with five foliar applied herbicides

Applied: Summer: 6/23/77
6/7/78
Fall: 11/3/77
11/8/78

Herbicide		Treatment season	control (10=100%) 11/3/77	5/18/78	11/8/78	9/11/79	5/12/80
2,4-D l.v.e.[1/]	2	Summer	6.5	0.8	4.8	1.5	1.3
		Fall	-	1.0	0.3	0.8	0.3
2,4,5-T l.v.e.[1/]	2	Summer	7.0	4.0	8.2	6.4	5.8
		Fall	-	2.3	2.0	2.0	1.3
glyphosate	2	Summer	7.5	7.3	8.7	9.0	8.6
		Fall	-	1.5	1.5	3.3	2.3
glyphosate	4	Summer	9.6	9.5	9.9	10.0	10.0
		Fall	-	1.5	1.3	6.8	7.6
triclopyr amine[2/]	2	Summer	7.8	7.8	9.6	10.0	10.0
		Fall	-	2.3	2.3	4.8	3.8
triclopyr amine[2/]	4	Summer	8.8	8.0	9.7	9.5	9.0
		Fall	-	3.5	3.0	4.0	3.8
fosamine[2/]	4	Summer	3.8	0.8	1.8	0.5	0
		Fall	-	0.8	0.5	0.8	0
fosamine[2/]	8	Summer	4.3	1.3	3.8	2.3	2.8
		Fall	-	1.5	1.0	1.0	0.3
picloram[2/]	0.5	-	-	-	-	-	-
		Fall	-	8.5	6.0	9.4	9.0
picloram[2/]	1	Summer	8.9	8.5	9.6	8.8	9.5
		Fall	-	9.5	8.5	9.4	8.5
control	-	-	0.3	0	0	0	0

1/ Diesel @ 0.5%

2/ Surfactant @ 0.5%

Response of mature deerbrush ceanothus to foliage-applied herbicides on a forest site. McHenry, W.B., R.L. Willoughby, D. Anderson and N.L. Smith. Deerbrush ceanothus can quickly occupy logged or burned California forest lands. Six foliage-applied, translocated herbicides were applied May 16, 1979, to 3 to 5 foot tall, flowering deerbrush following a brush-rake site preparation in the fall of 1975. Treatments were applied with a carbon dioxide pressurized knapsack sprayer to 20 by 20 foot plots calibrated to a volume of 20 gpa.

Low volatile esters of 2,4-D, 2,4,5-T, dichlorprop and triclopyr were applied individually at 1 and 2 lb ae/A; glyphosate at 1 and 2 lb and fosamine at 4 and 8 lb ai/A were applied. When evaluated July 22, 1980, the 2 lb. rates of 2,4-D, 2,4,5-T and triclopyr and both 1 and 2 lbs ai. of glyphosate and 4 and 8 lb. fosamine resulted in from 90% to 100% control. Dichlorprop provided 17% control at 2 lb.; 2,4-D 1 lb. plus dichlorprop 1 lb. averaged 80% control. (University of California Cooperative Extension, Davis CA 95616)

Evaluation of herbicides for deerbrush ceanothus control in a ponderosa pine plantation. McHenry, W.B., R.L. Willoughby, N.L. Smith, T. Robson, K. Glenn and D. Anderson. Growth of young conifers on reforested sites can be severely restricted from competition of brush species. A site near Forbestown, Calif. that was clear cut and replanted to Ponderosa pine in 1976 was selected to evaluate seven herbicides for the control of three year old (10 to 36 in. tall) deerbrush. Herbicides were applied November 1, 1979 utilizing a carbon dioxide pressurized sprayer calibrated to deliver 20 gpa. Surfactant (X-77) @ 0.5% v/v was included with fosamine, triclopyr amine, and 2,4-D water soluble amine. A random complete block designed was utilized with three replications. Plot size was 400 sq. ft. (20 by 20 ft.) and each contained an average of 5 pine trees. Treatments included 1 and 2 lb. ae/A of 2,4-D low volatile ester and water soluble amine, dichlorprop low volatile ester; triclopyr amine; 1 and 2 lb. ai/A of glyphosate, 4 and 8 lb. ai. of fosamine; 0.5, 1, 2 lb. ai. of hexazinone, 1 and 2 lb. ai. atrazine; and 2 lb. ae. of triclopyr low volatile ester and of 2,4-D oil soluble amine. Additional treatments of hexazinone, 0.5, 1, 2 lb.; atrazine, 1 and 2 lb. ai.; 2,4-D low volatile ester, 1 lb. ae.; dichlorprop low volatile ester, 1 lb. ae.; and glyphosate 1 lb. ai/A were applied March 19, 1980. The deerbrush ceanothus had 2 to 4 leaves per bud and the pines were commencing terminal growth.

Rainfall had totalled 70 in. on the fall treatments and 7 in. on the spring treatments when brush control was evaluated July 22, 1980. Fosamine gave 83% control at 4 lb. ai. and 90% at 8 lb. ai/A but pine survival at these same rates was 13% and 0% respectively. The fall application of hexazinone gave 86% brush control and 100% pine survival. The only other fall treatment providing effective brush control was 2 lb. ai/A glyphosate at 73% control and 100% pine survival. Spring applications of 2 lb. ai. hexazinone gave 90% brush control and glyphosate 1 lb. ai/A averaged 76% control. Of the spring treatments, only 2,4-D low volatile ester at the single rate, 1 lb. ae/A, injured pines (63% survival). (University of California Cooperative Extension, Davis, CA 95616)

PROJECT 4

WEEDS IN HORTICULTURAL CROPS

C. E. Stanger - Project Chairman

SUMMARY -

Fifty-two research reports are published in the horticultural section. Crops which weed control research was conducted in include tomatoes, potatoes, sweet corn, beans, onions, cherries, apples, peaches, plums, almonds, pistachios, peppers and citrus. States which research work was conducted in includes Arizona, California, Idaho and New Mexico.

Tomatoes (6 papers)- Treating the seedline with plugs or sulfuric acid in the fall and planting into the seedline showed considerable protection for spring seeded tomatoes against high rates (2 and 4 lbs/ac) of metribuzin. Chloropropham, metolachlor, ethalfluralin, chloroamben and diphenamid applied in combination with metribuzen gave excellent weed control in spring planted tomatoes when applied in the fall and activated by rain. Crop safety was adequate with metribuzin in all combinations except chloropropham and metolachlor. Excellent weed control and crop safety of ehtalfluralin is noted. In another trial evaluating the same herbicides greater crop tolerance was noted when the tomatoes were plug planted rather than direct seeded. Weed control evaluation of these treatments at the end of 4 months showed chloroamber to be weakest in combination with metribuzin. Chloropropham and ethalfluralin gave the best weed control. Timing of application for these treatments indicate that fall beds treated from November to January are effective. Application rates of metribuzin and metolachlor must be reduced to 1 and 2 lbs/A respectively unless tomatoes are plug planted.

The effect of plasticized paper mulch was evaluated for control of black nightshade with and without pebulate and metribuzin as a soil incorporated treatment. Tomatoes were direct seeded in the treated and untreated soil prior to applying the paper mulch. The mulch caused an increased retention of soil moisture and increased soil temperature. Holes were punched in the paper to allow tomato emergence. The mulch delayed tomato germination and seedling vigor but final stands and growth were increased. Pebulate treated beds showed only a slight increase in black nightshade control compared to mulch only treatments. Metribuzin very effectively controlled black nightshade but severely injured tomatoes at 0.25 lbs/ac. Metribuzin injury was increased by the mulch. Further studies should be conducted using an opaque product to decrease germination and growth of plants shaded by the mulch.

Onions (5 papers)- DCPA applied as preplant incorporated treatments at rates of 5.0, 7.5 and 10 lbs ai/A gave 100 percent control of barnyard grass, common lambsquarters, redroot pigweed, and prostrate pigweed with no adverse effect on yellow sweet spanish onions. In contrast weed control was essentially nil when DCPA was applied as a post plant preemergence treatment. Preplant treatments of metolachlor reduced onion stands by 15, 60, and 75 percent at rates of 1.5, 2.0 and 3 lbs/A respectively. Preemergence treatments of metolachlor at 1.5 and 2.0 caused no apparent injury to onions but weed control was inadequate. Bensulide applied at 4 and 6 lbs ai/ac preplant gave good control of barnyard grass and redroot pigweed fair control of common lambsquarters and poor control of hairy nightshade. Acifluorfen, oxyfluorfen, oxadiazon, bromoxynil and nitrofen as postemergence treatments gave good broadleaf weed control but caused onion injury at one location. Generally good broadleaf

weed control and crop tolerance was reported with oxadiazon and bromoxynil. Sulfuric acid gave excellent control of all broadleaf weeds when applied twice during the early stages of onion growth. Diclofop and BAS 9052 OH showed excellent onion tolerance and control of annual summer grasses.

Melons and cucumbers (3 papers)- a trial conducted to compare time of initial weeding in honeydew melons and cucumbers showed that delaying the rate of the first weeding until 2 weeks after crop emergence can easily result in yield reduction. Yield of cucumbers were more effected by delaying weeding date than honeydew melons. Cultivations and hand weeding within one-week after crop emergence is necessary to obtain optimum yields. Napropamide, pendimethalin, trifluralin, naptalam, chloroamben, bensulide and diclofop were evaluated for weed control and tolerance of honeydew melons and pickling cucumbers. All herbicides effectively controlled barnyard grass except napropamide at 1 and 2 lbs and naptalam at 6 lbs/ac. Chloroamben and naptalam were the only herbicides not reducing yield of cucumbers. Pendimenthalin, trifluralin, alanap and 2 lbs of napropamide reduced yields of honeydew melons. Ethalfluralin and napropamide were phytotoxic to canteloupes, particularly when power incorporated and direct seeded. Naptalam caused less injury. Plug planting safened the use of ethalfluralin and napropamide and over came all crop injury effects of naptalam.

Sweet corn (2 papers)- Herbicides which resulted in better than 90% control of hairy nightshade, redroot pigweed, barnyard grass and common lambsquarters with no adverse effect on yield include alachlor in combination with atrazine, cyanazine and bromoxynil; metolachlor + atrazine and metolachlor + cyanazine. Bromoxynil post emergence to corn gave excellent broadleaf weed control. Bromoxynil burned the leaves of the corn but the crop recovered and produced some of the better yields in the trial. The tolerance of sweet corn (Golden Jubilee var.) to cycloate with and without safener (R-25788) was evaluated. Results were considered inconclusive but indicated that sweet corn has good tolerance to cycloate at rates effective for weed control.

Malva sp and Goosefoot control (2 papers)- Effectiveness of glyphosate was evaluated when applied with different applicators at varying spray volumes and with different additives. Low spray volumes (1,2 and 4 gal/A) enhanced weed control significantly when these spray volumes were compared to volumes at 30 gal/A. Surfactant, non-phytotoxic oil and ethrel as additives did not benefit control. The "Herbi" applicator did not give as much control as the "Micro Max" at comparable glyphosate applications. In another trial the control of common mallow with oxyfluorfen and glyphosate was evaluated. Oxyfluorfen gave rapid activity with complete kill within 10 days of treatment. Glyphosate treatments were much slower and less effective at equal rates. Combination treatments were no more effective than oxyfluorfen alone.

Chile peppers (2 papers)- metolachlor at 2 and 3 lbs ai/A gave 95% season long control of yellow nutsedge when applied preemergence to nutsedge. Metolachlor applied at 3.0 lbs/A over the top of chile peppers had no adverse effects on the crop. Direct seeded chile pepper appears to have selectivity to trifluralin applied as a preplant incorporated treatment.

Potatoes (9 papers)-Quackgrass rhizomes dug from plants previously treated with BAS 9052 OH and RO138895 and placed in growth chambers for sprouting of new buds showed that RO138895 inhibited all sprouting at rates of 1 and 2 lbs/A. BAS 9052 OH at the same rates prevented 90% sprouting. Potatoes were tolerant to both herbicides. Metribuzin applied as a sequential treatment to potatoes when canada thistle was 2-12 inches tall resulted in 96% control of canada thistle at harvest. Metribuzin applications were on July 16 and 26 at rates of 0.5 lbs/ac each application. Metribuzin applied through a sprinkler irrigation system during different periods of a single irrigation showed that applications during the first part of the irrigation gave better weed control than when applied during the middle or end of an irrigation period. Two numbered acid amide herbicides (RE 28269 and SN 80786) were compared with metolachlor and alachlor as preemergence sprinkler incorporated treatments. RE 28269 at rates of 1.0 to 2.5 lbs/A showed good to excellent control of redroot pigweed and green foxtail. Lambsquarters was effectively controlled only at the 2.5 lb rate. SN 80786 gave excellent control of redroot pigweed and green foxtail but less effective on lambsquarters metolachlor and alachlor showed excellent initial control of all weeds, but later control of lambsquarters was less effective.

Beans (3 papers)- Herbicides applied as preplant incorporated treatments showed that combinations of herbicides were required for broad spectrum weed control. Combinations in which one of the components was ethalfluralin were superior treatments. EPTC + alachlor gave excellent early weed control but tended to fall off rapidly in mid and late season control of broadleaf weed. Bentazon applied as a postemergence treatment in combination with preplant incorporated treatments was also effective in giving season long broadleaf weed control.

Lettuce and carrots (2 papers)- The response of head lettuce to low rates of dicamba and 2,4-D applied at 3 stages of lettuce growth was studied. Each herbicide was applied at .0025, .025 and 0.25 lba/A as preemergence and postemergence treatments. Postemergence treatments were applied when the lettuce had 5 leaves and when the formed head was 10 inches in diameter. Dicamba caused growth effects from all treatments. 2,4-D caused injury symptoms at the highest rates only. At the end of 8 weeks regardless of treatment the lettuce had resumed normal growth although the greatest inhibitation of normal head lettuce development was caused by each herbicide applied at the 5 leaf and head initiation stage. Low rates of metribuzin in combination with oxadiazon and oryzalin - oxyfluorfen gave good control of smartweed, lambsquarters, and wildbucket without reducing yields of harvested carrots. Other herbicides evaluated gave good weed control but caused yield reduction.

Fruit and Ornamental tree crops (7 papers)- Granular formulations of napropamide and oxadiazon gave good selective annual bluegrass, barnyard grass, mustard, water smartweed control in several different kinds of ornamental trees. Liquid and wettable powder formulations of simazine and napropamide were compared for weed control in cherries. No difference in control of annual weeds between formulations of simazine was noted. However, wettable powder formulation of napropamide gave better weed control than did the liquid. In another trial outstanding treatments for general weed control in cherries included glyphosate + dichlobenil, paraquat + dichlobenil, glyphosate + simazine, glyphosate = napropamide + simazine. Dichlohenil showed good activiety on field bindweed and dandelion but caused slight amount of chlorosis on several sweet cherry varieties when applied at rates of 6 lbs/A. In apples out of several herbicides tested glyphosate + dichlobenil and paraquat + dichlobenil were superior. In this trial, however, glyphosate did not control field bindweed as expected. The researcher suggest possible antagonistic affects when glyphosate is used in combination with simazine, napropamide, diuron or terbacil. Combinations of glyphosate + dichlobenil was very effective in selectively controlling weed in prunes. In other trials effective herbicides tested for weed control in plums and prunes include fluridone and NC 20484. In a young nursery orchard puncturevine was effectively controlled with oxyfluorfen, Fluridone and R40244.

Grapes (1 paper)- Six mixed varieties of newly planted wine grapes and two table grapes were treated at average bud break with herbicides to study grape tolerance. Very little or no foliage injury was noted with oxyfluorfen, paraquat, glyphosate, amitrol or dinoseb. Injury was noted with 2,4-D at both 1.0 and 2.0 lbs on April 20 when treatments were applied on March 7. However, by June 6 very little injury was evident to grapes treated with 1.0 lb of 2.4-D. There also appeared to be a significant difference in tolerance between grape varieties to 2,4-D.

Citrus (4 papers)- The concentration of leaf nitrogen in Valencia oranges was increased when established bermuda grass stands infesting plot area was eliminated by paraquat treatments. In irrigated citrus variations in weed densities had very little affect in changing soil moisture levels. The effect of the various weed populations on the leaf water potential of orange trees varied. In furrow and sprinkler irrigated plots with established annual weeds, the trees had significantly lower water potential compared to weed-free plots. In plots with recently established annual weeds lower water potential in oranges have occurred only during summer months. In bermuda grass infested plots, generally mid-day water potential increased from January to April, decreased to a minimum in July, and increased in October, while pre-dawn water potentials increased from January to April, then decreased in July to October.

In lemon groves herbicides were evaluated for control of horseweed, lovegrass, and barnyard grass. Oryzalin at 2 or 4 lbs. ai/A and napropamide at 4 and 8 lbs. ai/ac were equally effective up to ten weeks. In late summer months oryzalin was more effective than napropamide in lovegrass and barnyard grass control. Combination of oryzalin and napropamide were only slightly more effective than oryzalin alone. The young lemon trees were tolerant to all treatments.

Almond and Pistachios (5 papers) NC 20484 significantly reduced number of nutsedge tubers at ½ to 4 lbs./A, but foliar symptoms to almonds occurred at all rates. Glyphosate salt (2 lbs.) and oxyfluorfen plus 2,4-D omine at 1 and 2 lbs. respectively applied using a Micro-max controlled droplet applicator effectively controlled 2-8 inch cheeseweed. Only glyphosate was effective on grass species. Adding 2,4-D to glyphosate reduced glyphosate activity markedly. Weed control under drip irrigation in Pistachio orchards shows oxyfluorfen in combination with napropamide, simazine and oxyzalin and simazine in combination with prodiamine to effectively control pigweed, lovegrass, and barnyard grass for at least five months. Napropamide used alone was not satisfactory. Emitting napropanide, oryzalin, oxidiazon, oxyfluorfen and prodiamine through drip irrigation systems showed this method to be a safe way of applying herbicides to second leaf pistachio rootstalks. All herbicides gave effect spotted spurge control except napropamide. A five year herbicide study in drip irrigated pistachio where herbicides were applied annually to control filarie, smooth catsear, foxtail, flaxleaf fleabane, marestail, common groundsel and soft chess show the various herbicides to be ineffective for controlling the following weeds: simazine (filaree), simazine + napropamide (filaree and fleabane), simazine + oxyzalin (filaree and fleabane), norflurazon (filaree and fleabane), oxyfluorfen + norflurozon (maretail), oxyfluorfen + napropamide (fleabane) and oxyfluorfen + oxyzalin (fleabane).

Protecting processing tomatoes from metribuzin phytotoxicity. Lange, A. H. The phytotoxicity of many herbicides can be reduced by the use of activated carbon, i.e., plug planting, transplanting, carbon in transplant water, seedline, etc. Decreasing the pH has also been reported as a means of deactivating triazine herbicides. In as much as sulfuric acid is inexpensive and available in large amounts from the oil refining industry and other industrial by-products, it was chosen as a soil amendment in this field experiment.

Five foot beds were formed (April 21, 1979) and plug planted using our standard peat-vermiculite 5% carbon, mag-amp mix and a 50% standard mix plus 25% rice hull plus 25% UCD soil. The empty plug planter was also used to make holes for the dilute sulfuric acid applied at the rate of 50 and 100 lb. sulfuric acid per acre. Another set of plots were treated the same on March 26, 1980.

All plots received metribuzin at rates of 2 and 4 lb/A on November 21, 1980 and was carried in by .48 inches of rainfall. The soil is a Panoche clay loam (24% sand, 36% silt, 40% clay, 1% organic matter).

All the fall plugs were covered by a band of a spray containing 250 lb/A activated carbon plus 250 lb/A of snow sprayed on a 3 inch cover over the plug row (114 grams of carbon plus 114 grams snow per gallon using a 8008-E nozzle) delivery 27cc per second, i.e., 20 sec. per 25 ft. The spring plugs did not receive this cover over the plug.

Placing the plugs in fall beds and seeding into the plug line protected the spring germination of tomatoes from metribuzin. The protection in the rice hull mixture seemed slightly better than more expensive standard mix. Leaching the planting site with sulfuric acid also appeared worthwhile at the lower rate of metribuzin. The higher rate of metribuzin was apparently too phytotoxic to be sufficiently deactivated by March 20, 1980 (table 1).

The rate of metribuzin was too high based on the excellent weed control and the phytotoxicity to the crop.

By the middle of June after the plants had been pulled and the plots reseeded, the spring plug-acid lines were responding closer to the old plug-acid lines. The old plug line may have been depleted by the movement of the seeder shank through plugs (i.e., spreading the seed and protection media).

In summary, treating the seedline with plugs or sulfuric acid in the fall and seeding into the treated seed line (i.e., plugs and acid treatments) showed considerable protection for spring seeded tomatoes against high rates of metribuzin.

The effect of protective soil applications in the seed row applied in the fall vs. in the spring (425-78-513-186-2-80)

Herbicides[1/]	lb/A	Standard Mix		50% ReadyEarth 25% Rice Hulls 25% UCD Soil		Sulfuric Acid 50 lb/A		Sulfuric Acid 100 lb/A		Direct Seeded[4/] 0
		Fall[2/]	Spring[3/]	Fall	Spring	Fall	Spring	Fall	Spring	No Protection
Stand and Vigor[5/]										
Metribuzin	2	6.8	3.8	8.0	2.0	6.5	3.0	5.5	1.0	1.3
Metribuzin	4	5.8	2.5	6.0	1.2	2.0	0.5	2.0	2.2	0.5
Check	-	8.2	7.2	7.8	7.8	-	-	8.5	8.2	7.1
Weed Control[6/]										
Metribuzin	2	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Metribuzin	4	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Check	-	5.0	4.0	0.2	1.0	-	-	2.2	5.0	3.6

1/ Applied 11/21/79.
2/ All fall plug plots received a protective snow-carbon cap but no seed 11/21/79.
3/ Herbicides applied 11/21/79 plug planted and direct seeded 3/26/80.
4/ Average of 24-32 replications.
5/ Average of 4 replications where 0 = no stand and 10 = best stand and vigor. Seeded 2/29/80.
6/ Average of 4 replications where 0 = no weed control and 10 = best weed control. Evaluated 4/29/80.

Fall bed weed control studies with transplant tomatoes. Lange, A. H. Beds were prepared early in December of 1979 in a sandy loam soil east of Dinuba. The herbicides were sprayed over the bed top December 5, 1979 and rained in (7 inches of water). Weed control was excellent but the grower worked the top of the beds prior to planting speedling cherry tomatoes on March 1, 1980. The plots were 1 bed by 20 ft. replicated three times.

On April 23, 1980 a weed control and stand rating were made. All herbicides gave excellent weed control in spite of the heavy rains and disturbance just before planting. Metribuzin was a little weak on prostrate pigweed at 1 lb/A and too phytotoxic much above 2 lb/A. Combinations were excellent for weed control and safety except for chlorpropham which wiped out the tomatoes at both rates. This may have been due to the growers' working the bed top prior to planting and the heavy rains on the soil types.

Metolachlor at 4 lb/A applied four months prior to transplanting tomatoes was also too phytotoxic. Had these been plug planted, no injury would have occurred. The excellent weed control and safety of ethalfluralin should be noted. (University of California, Kearney Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648).

The effect of preplant preemergence herbicides on subsequent weed control and tomato stand (425-10-513-186-1-80).

Herbicides	lb/A	Average Weed Control 1/ Crabgrass	Prostrate Pigweed	Average 2/ Tomato Stand
Metribuzin	1	8.0	5.3	9.3
Metribuzin	2	9.0	10.0	7.3
Metribuzin	4	9.7	10.0	3.3
Metribuzin+Chlorpropham	1+2	8.7	8.7	0.3
Metribuzin+Chlorpropham	1+4	9.0	9.5	0.0
Metribuzin+Metolachlor	1+2	9.7	8.3	9.3
Metribuzin+Metolachlor	1+4	10.0	9.3	6.3
Metribuzin+Ethalfluralin	1+1	10.0	10.0	7.7
Metribuzin+Ethalfluralin	1+2	10.0	10.0	9.3
Metribuzin+Chloramben	1+8	8.7	8.7	8.7
Metribuzin+Diphenamid	1+8	7.7	7.0	9.0
Check	-	0.0	0.0	8.0

1/ Average of 4 replications where 0 = no weed control and 10 = best control, no weeds. Evaluated 4/23/80.

2/ Average of 4 replications where 0 = no tomato stand and 10 = best stand and vigor, healthy plants.

Fall bed preemergence weed control in a Delhi loamy sand under sprinkler irrigation. Lange, A. H. Fall beds were layed-up November 4, 1979 and treated with herbicides November 6, 1979. The plots were direct seeded and plug planted March 3, 1980. Each plot was one bed by 20 ft. replicated seven times in a Delhi loamy sand (0.1% organic matter).

Excellent weed control was obtained during the winter. Only chloramben appeared to be somewhat weak in combination with metribuzin when rated four months after application. On April 20, 1980 chlorpropham and ethalfluralin gave the best weed control.

The plots were plug planted and seeded without reworking the bed tops except for the untreated check which was hand weeded.

Six weeks and two months after planting (5 1/2 and 6 months after herbicide applications) the weed control had decreased. The combination of metribuzin and diphenamid was best for the weeds present which did not include any of the nightshades.

The plug planted tomatoes were far better than the direct seeded, but there was only slight herbicidal toxicity from any of the herbicides, metribuzin being most damaging of the herbicides when applied alone and less so in combination. Plug planting gave adequate protection when metribuzin was used at 1 lb/A. (University of California, Kearney Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648.)

The effect of fall preemergence herbicide mixtures on spring planted tomato vigor using two planting methods (425-73-513-186-1-80)

Herbicides	lb/A	Vigor 1/ Direct Seeded	Vigor 1/ Plug Planted	Weed Control 2/
Metribuzin	1	7.3	9.1	7.6
Metribuzin	2	7.7	8.8	6.7
Metribuzin+Chlorpropham	1+4	6.4	9.1	6.4
Metribuzin+Chlorpropham	1+8	6.0	9.3	8.0
Metribuzin+Diphenamid	1+8	6.4	8.6	5.4
Metribuzin+Diphenamid	2+8	6.1	9.4	7.0
Metribuzin+Metolachlor	1+2	6.9	9.0	5.7
Metribuzin+Metolachlor	1+4	6.7	8.8	6.6
Metribuzin+Ethalfluralin	1+2	6.7	9.1	7.3
Metribuzin+Ethalfluralin	1+4	5.4	9.1	8.4
Metribuzin+Chloramben	1+8	5.4	8.7	3.7
Check	-	4.8	7.3	3.6

1/ Average of 7 replications where 0 = no growth and 10 = best growth.
2/ Average of 7 replications where 0 = no control and 10 = best control, no weeds. Evaluated 4/20/80. Treated 11/6/79.

The effect of timing fall preemergence applications. Lange, A. H. Herbicides were applied to pre-formed beds on three different dates at the West Side Field Station (soil is a Panoche clay loam 24% sand, 36% silt, 40% clay, 1% organic matter) from mid-November until mid-January. Annual weeds were controlled very well at all rates of metribuzin. Chloramben was not as effective as chlorpropham, metolachlor, ethalfluralin or diphenamid. All but the last herbicide would have controlled nightshade had it been present and germinating.

All plots were direct seeded February 29, 1980 and again on March 26, 1980 on one side of the bed. Plugs were planted on the other side on the March 26th planting.

From the earlier seeding, all rates of metribuzin were phytotoxic at all timings. The weed control was outstanding.

The other herbicides were considerably less toxic with the exception of chlorpropham. All herbicides gave good to excellent weed control except chlorambe.

These timing results suggest tnat lower than 1 lb. rates of metribuzin would be necessary for direct seeded tomatoes. Rainfall incorporation of chloramben was not outstanding when allowed to set on the soil surface for seven days, and then receive .68 inches of rain. At least the residual activity was reduced. The other herbicides did not appear to be greatly affected.

When these same plots were plug planted and seeded later (March 26) the direct seeded tomatoes were still affected by metribuzin at 2 lb/A and above. When the treatment rate was 1 lb/A the December 20 application date was safe but when applied on January 18 it was too active except when plug planted. Plug planting, however, did not protect tomato seedlings when metribuzin was applied at 2 lb/A and greater.

The other herbicides were safe when applied on December 20, 1979 and seeded March 26, 1980 with the exception of metolachlor. When plug planted all were safe. By June 17, 1980 the weed control was beginning to decrease except for metribuzin.

In summary, fall beds treated from November to January could be treated with a number of effective herbicides including the herbicides in this trial. The rate of metribuzin would need to be less than 1 lb/A unless plug planting was used. The rate of metolachlor would also have to be used at less than 2 lb/A unless plug planted. Both chlorpropham and chloramben might need to be used at a higher rate in order to maintain weed control although a layby treatment might be more efficient. (University of California, Kearney Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648.)

The effect of timing and fall herbicides
on the growth of spring planted gel and direct seeded tomatoes in fall formed beds
(425-78-513-186-1-80)

		Average Vigor 1/						Average Weed Control 2/		
		Plug Planted Treatment Date			Direct Seeded Treatment Date			Treatment Date		
Herbicides	lb/A	11/20/79	12/20/79	1/18/80	11/20/79	12/20/79	1/18/80	11/20/79	12/20/79	1/18/80
Metribuzin	1	-	9.3	9.7	-	8.0	5.0	-	9.7	9.0
Metribuzin	2	4.7	5.0	-	5.0	5.0	-	9.3	10.0	-
Metribuzin	4	4.3	-	-	1.7	-	-	10.0	-	-
Chlorpropham	4	-	9.3	-	-	8.3	-	-	4.7	-
Chloramben	8	-	7.3	-	-	9.0	-	-	6.7	-
Metolachlor	4	-	8.0	-	-	5.7	-	-	4.3	-
Ethalfluralin	4	-	9.0	-	-	9.7	-	-	6.7	-
Diphenamid	8	-	9.7	-	-	8.3	-	-	6.7	-
Check	-	8.3			9.3			3.3		

1/ Average of 3 replications where 0 = no stand and 10 = best stand and vigor.
2/ Average of 3 replications where 0 = no weed control and 10 = best weed control, all weeds dead.
Treatents indicated at top of table. Evaluated 6/17/80.

The effect of combination preemergence herbicides for fall bed treatment. Lange, A. H. Herbicides were applied to preformed beds on three different dates in a random block field trial at the West Side Field Station (soil was a Panoche clay loam). The combinations with metribuzin at the high rate (2 lb/A) was applied November 20, 1979. The middle rate (1 lb/A) was applied December 20, 1979 and the light rate (1/2 lb/A) was applied January 18, 1980 as described in the tables. All rates at all dates were not applied because of limited land and funds.

The weed control was excellent at all rates and dates, indicating that the rates of metribuzin were probably too high although 1/2 lb/A in January was poorer than higher rates applied earlier. However, all combinations gave adequate weed control or nearly so (7.0 being commercially acceptable) early in the season and this control increased by March after all plots were sprayed out January 31, 1980. The later ratings may have given higher ratings because of this spray job.

Once the untreated check is subtracted, phytotoxicity was not great when rated March 26, 1980. Phytotoxicity to the direct seeded tomatoes was greater where chlorpropham was part of the combination than other herbicides.

By summer the tomatoes had been reseeded (March 26, 1980) by direct seeding on one side of the bed and plug planting on the other side of the bed.

Plug planting gave better plants where herbicides had been used. All herbicides showed some injury on tomato plants particularly where 2 lb/A metribuzin was part of the combination. The 1/2 and 1 lb/A gave much better tomato plants.

Since metribuzin is not particularly good on nightshade, combinations with nightshade effective herbicides such as chlorpropham, chloramben, metolachlor, and ethalfluralin could be expected to give nightshade control in the spring or until a layby treatment could be made. In order to have enough of these herbicides present at tomato planting time to control nightshade, it would be reasonable to assume tomatoes would need some degree of protection at least during germination. (University of California, Kearney Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648.)

The effect of timing and fall herbicide combinations on the growth of spring planted plug and direct seeded tomatoes in fall formed beds (425-78-513-186-1-80)

		Average Vigor[1/]						Average Weed Control[2/]		
		Plug Planted			Direct Seeded					
		Metribuzin			Metribuzin			Metribuzin		
Herbicides	lb/A	2# applied 11/20/79	1# applied 12/20/79	1/2# applied 1/18/80	2# applied 11/20/79	1# applied 12/20/79	1/2# applied 1/18/80	2# applied 11/20/79	1# applied 12/20/79	1/2# applied 1/18/80
Chlorpropham	2	-	8.7	9.0	-	8.0	9.3	-	9.3	9.7
Chlorpropham	4	7.7	6.3	-	5.7	6.0	-	9.7	9.7	-
Chlorpropham	8	7.3	8.7	-	7.3	5.3	-	10.0	9.0	-
Chloramben	4	-	8.7	8.7	-	7.7	8.0	-	9.7	9.3
Chloramben	8	6.0	8.3	-	6.0	6.7	-	9.7	10.0	-
Metolachlor	2	-	9.3	8.7	-	6.3	8.7	-	9.7	9.3
Metolachlor	4	7.3	7.7	-	3.7	6.3	-	10.0	9.3	-
Ethalfluralin	2	-	8.7	9.7	-	8.0	8.0	-	9.7	8.7
Ethalfluralin	4	6.7	9.0	-	5.0	7.7	-	10.0	10.0	-
Diphenamid	4	-	9.3	9.3	-	6.0	9.3	-	9.7	9.3
Diphenamid	8	6.3	8.7	-	6.3	7.0	-	9.7	9.7	-
Check	-	8.3			9.3			3.3		

1/ Average of 3 replications where 0 = no stand and 10 = best stand and vigor.
2/ Average of 3 replications where 0 = no weed control and 10 = best weed control, all weeds dead. Treatments indicated at top of table. Evaluated 6/17/80.

Effect of plasticized paper mulch on black nightshade control in tomatoes. Wach, M.J., J.T. Woods, C.L. Elmore. A new product, consisting of Kraft-type paper laminated to a thin layer of plastic, manufactured by the Crown Zellerbach Corporation was investigated as a potential control for black nightshade in tomatoes. In addition, its effect on nightshade control with pre-plant herbicide applications was investigated. A volatile and a non-volatile herbicide were used in the study, as it was hoped the plastic component of the mulch would reduce the dissipation of a volatile herbicide, thereby increasing its effective concentration in the soil.

The trial was established on August 5, 1980 on a Yolo fine sandy loam soil which had been fumigated with methyl bromide. Black nightshade seed was broadcast planted at a rate of 24 seeds/sq. ft. The herbicides were applied using a CO_2 pressure sprayer at 50 gal/A. Pebulate was applied at rates of 1.5,3, and 6 lb/A, and metribuzin was applied at rates of 0.25, 0.5 and 1.0 lb/A. Herbicides were incorporated with a power tiller. Each treatment was replicated four times, and four untreated plots were used as a control. The plots were arranged in a randomized block design, and each 60" by 15' plot was split into two 30" by 15' sub-plots. Each sub-plot was planted with processing tomato variety UC82 at a depth of 3/4" and a rate of 30-40 seeds/linear foot. One sub-plot in each pair was covered with the mulch, applied paper side down, and the edges of the mulch were covered with soil to seal them to the bed. The plots were furrow irrigated as needed. When germinated seedlings were seen in the uncovered beds, holes, 2" x 2" and spaced 10" apart, were punched in the mulch directly over the seed row to allow emerging seedlings to grow through.

The immediate effects of the paper were the increased retention of soil moisture as compared to uncovered soil, and a increase of soil temperature: 4.8^{o}F higher at the soil surface, and 2.8^{o}C higher at a depth of 20cm, measured mid-morning in full sun. Tomato germination was delayed 2-3 days in the mulched beds, and the resultant plants remained slightly smaller than those in uncovered beds throughout the trial. On September 6, the numbers of tomato and nightshade plants per linear foot were counted and the tomatoes were scored for vigor. On September 15, the mulch was removed from the beds, although in some cases, vigorous weed and tomato growth under the mulch had already torn through it. In the control plots, weeds growing under the mulch were stunted, etiolated, and severely attacked by flea beetles, when compared to weeds in the uncovered control beds. Tillam treated beds showed only a small increase in nightshade control when compared to untreated beds. Metribuzin was very effective in controlling nightshade, especially at the high rate, however, metribuzin caused tomato damage (chlorosis, stunting, reduced stand) even at the low rate. This damage was increased slightly by the presence of the mulch.

A suggestion to the manufacturer would be to make the product opaque, which may decrease the germination and growth of plants under the mulch, even without an herbicide application. In addition, the mulch should be investigated for its moisture retention and soil warming capabilities. (University of California Cooperative Extension, Davis, CA 95616).

Effect of plasticized paper mulch on black nightshade control in tomatoes

Treatment	Rate (lb/A)	Mulch	Tomato stand [1/]	Vigor [2/]	Nightshade stand [1/]
pebulate	1.5	-	16.7	8.8	10.4
pebulate	1.5	+	21.8	4.8	16.5
pebulate	3.0	-	17.3	10.0	12.6
pebulate	3.0	+	31.5	6.8	15.8
pebulate	6.0	-	11.5	8.5	11.4
pebulate	6.0	+	32.3	6.0	15.8
metribuzin	0.25	-	14.9	8.5	3.8
metribuzin	0.25	+	33.0	6.8	3.0
metribuzin	0.5	-	12.5	6.0	2.0
metribuzin	0.5	+	17.6	3.5	1.1
metribuzin	1.0	-	16.5	5.0	0.2
metribuzin	1.0	+	22.1	3.0	0.0
control	-	-	18.9	7.5	10.1
control	-	+	18.0	3.8	18.0

1/ Stand expressed as the number of plants per linear foot. For mulched plots, stand equals the average number of plants in one 2" x 2" hole multiplied by 6. Numbers represent the average of four replicates.

2/ 10 = 100% vigor, 0 = death. Numbers represent the average of four replicates.

Evaluation of herbicide injury to onions in the desert. BELL, C.E., D.W. Cudney and L. Ede. A field study was conducted in the Imperial Valley yo evaluate herbicide injury to onions under desert conditions. Bromoxynil was applied at 0.3 and 0.6 in two sets of plots. In one trial, bromoxynil was sprayed at various leaf stages (1 to 2, 3 to 4, and 5 to 6). In the other trial, bromoxynil was applied at the 3 to 4 leaf stage in various amounts of water (15, 30, and 60 gallons per acre). Diclofop at 2 and 4 lb/A, barban at 0.375 and 0.75 lb/A and DCPA at 10 lb/A were also applied at the 3 to 4 leaf stage. Treatments at the 1 to 2 leaf stage were on December 17, 1979, the 3 to 4 leaf stage were on February 1, 1980 and the 5 to 6 leaf stage were on February 29, 1980. Application was with a CO_2 pressure sprayer, no surfactants were used. The soil was a Holtville sandy loam and DCPA was used preemergence in all treatments. Dehydrator onions, variety Creole, were sown in four seedlines on 42 inch beds.

Visual observations were used to determine injury from the various herbicides. Observations on February 4, February 29 and March 11, 1980 indicated that there was no injury to the onions from diclofop, barban and DCPA. Yield data taken on May 19, 1980, showed no significant difference from the treated plots and the untreated control.

Although bromoxynil did not injure onions when sprayed at the 1 to 2 leaf stage, treatments at the 3 to 4 and 5 to 6 leaf stage caused all of the mature leaves to collapse and appear wilted, however, plants appeared to recover and continue growth. In treatments at the 3 to 4 leaf stage, the gallons per acre used had some influence, the lower gallon per acre rate resulted in more injury than the higher rates. Yield data taken on May 19, 1980 showed no significant difference in these plots, however. Yield data was significant for treatments at different growth stage. (University of California, Cooperative Extension, Courthouse, 939 Main, El Centro, Ca. 92243.).

Table 1. Bromoxynil injury to onions at three stages of growth.

Treatment	lb/A	leaf stage	injury rating[1/] 2/4	3/11	yield [2/] 5/19
Bromoxynil	.3	1 to 2	0	0	15.9
Bromoxynil	.6	1 to 2	0	0	15.3
Bromoxynil	.3	3 to 4	2.6	0	15.8
Bromoxynil	.6	3 to 4	3.7	.3	14.9
Bromoxynil	.3	5 to 6	0	2	14.8
Bromoxynil	.6	5 to 6	0	3	12.9
Check			0	0	16.2

1/ injury rating, 0 = no injury, 10 = all plants dead

2/ yield of 2 feet of 2 beds in middle of plots, average of four replications.

Table 2. Bromoxynil injury to onions when applied in different amounts of water.

Treatment	lb/A	GPA	injury rating[1/] 2/4	3/11	yield[2/] 5/19
Bromoxynil	.3	15	2.8	0	23.8
Bromoxynil	.6	15	4	0	23.9
Bromoxynil	.3	30	2.4	0	23.3
Bromoxynil	.6	30	3.5	0	22.2
Bromoxynil	.3	60	2	0	24.6
Bromoxynil	.6	60	2.9	0	23.5
Check			0	0	24.7

1/ injury rating, 0 = no injury, 10 = all plants dead

2/ yield of 3 feet of 2 beds in middle of plots, average of four replications.

Preplant and preemergence applications of DCPA and metolachlor in spring-seeded onions. Anderson, W. Powell and Gary Hoxworth. DCPA, at 5, 7.5, and 10 lb ai/A, and metolachlor, at 1.5, 2, 2.5, and 3 lb ai/A, were applied February 4, 1980, to the surface of preformed plant beds and soil incorporated about 1-inch deep with a power-tiller mounted ahead of a bed-shaper. Onions (var. Yellow Sweet Spanish) were seeded in the treated beds and into untreated adjacent beds, with two rows of onions per bed. On February 5, 1980, the same treatments as noted above were applied preemergence to the onions on previously untreated beds. Each treatment, including untreated controls, were replicated four times. Individual plot size was 6.7 ft x 30 ft (two beds wide by 30 ft long). The treatments and replications were randomized, but the preplant and preemergence treatments for each dosage were paired and randomized as a paired-group. A single, untreated bed separated paired-treatments from other paired-treatments, extending lengthwise through the experimental area. These untreated beds served to provide a means whereby the infestation of weed species throughout the experimental area could be determined. Later in the season, a 4 ft walkway was made along the ends of adjacent plots by removing the vegetation from a 2 ft section at both ends of an individual plot, thereby reducing the onion rows to a length of 26 ft. Following application of the preemergence treatments, the entire experimental area was watered by furrow irrigation, and, for the duration of the experiment, subsequent waterings were by this same means.

Visual evaluations recorded May 8, 1980, indicated that essentially 100 percent control of annual grass (barnyardgrass) and broadleaved (common lambsquarter, redroot pigweed, prostrate pigweed) weeds was obtained with preplant applications of DCPA at 5, 7.5, and 10 lb ai/A. In contrast, the degree of weed control from the preemergence DCPA treatments was essentially nil, even at the highest dosage. There appeared to be no adverse effects to the onions from either the preplant or preemergence DCPA treatments. Yield data was not obtained.

Visual evaluations recorded May 8, 1980, indicated that preplant treatments of metolachlor reduced onion stands by 15, 60, 60, and 75 percent at dosages of 1.5, 2, 2.5, and 3 lb ai/A, respectively. In contrast, the 1.5 and 2 lb ai/A dosages caused no apparent onion stand reduction or had any other adverse effect on the onions when applied preemergence. Dosages of 2.5 and 3 lb ai/A applied preemergence reduced onion stand by 5 to 10 percent. Barnyardgrass was controlled 100 percent with any one of the four dosages of metolachlor applied either preplant or preemergence. The preplant treatments of metolachlor controlled common lambsquarter and redroot pigweed about 90 percent, but the preemergence treatments resulted in very poor control of broadleaved weeds.

In summary, preplant, soil incorporated, treatments of DCPA were far superior than corresponding preemergence treatments with respect to control of annual grass and broadleaved weeds, and in neither case were the spring-seeded onions injured. Preplant, soil incorporated, treatments of metolachlor reduced onion stands, but, at dosages of 1.5 and 2 lb ai/A, applied preemergence metolachlor appeared not to adversely affect the onions. (Agr. Expt. Sta., New Mexico State University, Las Cruces, N.M. 88003.)

Influence of timing on the control of barnyardgrass in onions from postemergent herbicides. Brenchley, R. G. This study was initiated to evaluate the effectiveness of two postemergent herbicides selective on onions as influenced by the stage of growth of barnyardgrass. Experimental area received 120 lb/A nitrogen and 120 lb/A P_2O_5. Bensulide 5 lb ai/A was applied preplant incorporated prior to seeding. Yellow Sweet Spanish onions (variety: Monarch) were seeded in 18 inch rows on 42 inch beds on April 11, 1980.

Post emergence treatments were applied broadcast in water on May 3, May 12 and May 17, 1980 using a four nozzle (8003) boom attached to a CO_2 propelled knapsack type sprayer. Spray pressure was 30 psi calibrated to give 35 gpa total spray solution. Plots were 8 by 35 ft. arranged in a randomized complete block design with three replications per treatment.

Environmental conditions at the time of application were as follows: (May 3, 1980, air temperature 69 F, soil temperature 60 F, relative humidity 32%, cloud cover 0%, wind SE 5 mph) (May 12, 1980, air temperature 63 F, soil temperature 54 F, relative humidity 67%, cloud cover 25%, wind NW 2 mph), (May 17, 1980, air temperature 60 F, soil temperature 60 F, relative humidity 85%, cloud cover 5%, wind NW 5 mph).

Precipitation following herbicide application was .14 inches May 9 to 10, .38 inches May 15, .35 inches May 16, 1.15 inches May 23 to 29, 1980.

Results show that as barnyardgrass gets more mature it becomes more difficult to control with diclofop. By increasing the rate of diclofop to 1.5 lb ai/A excellent control was obtained up to the 8-10 leaf stage of barnyardgrass. Small (1-3 leaf stage) annual grasses were controlled by 0.5 lb ai/A of diclofop. BAS-9052-OH controlled all stages of growth of barnyardgrass at the lowest rate of 0.5 lb ai/A. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Post emergence timing study on onions

Treatments[1/]	Rate lb ai/A	Onions % Stand	% Stunt	% Control Barnyardgrass
Barnyardgrass 0.5 to 1.0 inch, 1 to 3 leaves				
Diclofop	0.5	100	0	95
Diclofop	1.0	100	8	100
Diclofop	1.5	100	15	100
BAS-9052-OH	0.5	100	0	100
BAS-9052-OH	1.0	100	10	100
Barnyardgrass 2 inches, 4 to 6 leaves				
Diclofop	0.5	100	0	75
Diclofop	1.0	100	0	100
Diclofop	1.5	100	5	100
BAS-9052-OH	0.5	100	0	100
BAS-9052-OH	1.0	100	0	100
Barnyardgrass 2-4 inches, 8 to 10 leaves				
Diclofop	0.5	100	0	25
Diclofop	1.0	100	0	70
Diclofop	1.5	100	0	98
BAS-9052-OH	0.5	100	0	99
BAS-9052-OH	1.0	100	0	100

1/ BAS-9052-OH was applied with MOR-ACT surfactant at 1.0% v/v.

Herbicide evaluations for weed control in onions. Brenchley, R. G. and D. L. Zamora. A field study was established at the SW Idaho Research and Extension Center near Parma, Idaho to determine the effectiveness of several preplant and post emergence herbicides for annual weed control in furrow irrigated bulb onions. Herbicides were applied broadcast in water on April 16, 1980 (preplant incorporated) and June 8, 1980 (post emergence) using a six nozzle (8003) single-wheel, push-type, sprayer propelled with 40 psi air pressure with a delivery rate of 42 gpa total spray volume. Plots were 10 by 35 ft. arranged in a randomized complete block design with three replications. Immediately after application, the preplant treatments were incorporated using a Lely Roterra unit set at a 1 to 2 inch depth. Yellow Sweet Spanish onions (variety: Monarch) were seeded in 18 inch rows on 42 inch beds on April 17, 1980. Experimental area received 120 lb/A nitrogen and 120 lb/A P_2O_5 prior to seeding. Environmental conditions at the time of application were as follows: (April 16, 1980, air temperature 76 F, soil temperature 58 F, relative humidity 20%, cloud cover 0%, wind E 3 mph, soil was moist to within one inch of the surface), (June 8, 1980, air temeprature 69 F, soil temperature 70 F, relative humidity 50%, cloud cover 80%, wind SE 2 mph, soil was dry for top 2 inches of soil). Soil type was silt loam, pH 7.1, 1.2% organic matter and CEC 13 meq.

Rainfall conditions were as follows: .33 inches on April 24, .02 inches on May 6, .07 inches on May 8 (3 hours after post emergence treatments were applied), .07 inches on May 10, .38 inches on May 15, .35 inches on May 16, 1.16 inches from May 23 to 29, .28 inches on June 2, .22 inches on June 4, .20 inches on June 12, .09 inches on June 24, .20 inches on July 3, and .10 inches on August 18. Plots were irrigated May 3, and May 14.

Weed control evaluations were taken May 20, 1980 and June 19, 1980. Weeds present and their density per square foot on May 20, 1980 were hairy nightshade 15, redroot pigweed 15, common lambsquarters 0.7, barnyardgrass 27. Stage of growth of weeds on June 19, 1980 when post emergence treatments were applied was hairy nightshade .75 inches with 4 to 6 leaves, redroot pigweed 0.25 inches with 2 to 4 leaves, common lambsquarters 0.75 inches with 2 to 4 leaves, barnyardgrass 1 to 2 inches with 2 to 4 leaves, onions 1 to 2 inches with 1 leaf.

Results from these studies show that DCPA and ethofumesate gave 90% plus control of barnyardgrass, lambsquarters and pigweed but were very weak on hairy nightshade. Bensulide gave excellent control of pigweed and barnyardgrass, fair control of lambsquarters and poor control of hairy nightshade. Propachlor gave good control of pigweed and barnyardgrass early in the season however after one or two irrigations all weeds rapidly reinfested the plots particularly in the corrugates where the plots were irrigated. DCPA gave much more injury to onions in this experiment than is normally expected in this area, perhaps due to the unusually cool, wet period immediately after treatment. Acifluorfen, oxyfluorfen, oxadiazon, bromoxynil and nitrofen (post emergence) all showed excellent activity on all annual broadleaf weeds but crop injury was unacceptable. Much of the crop injury could be attributed to the unusually cool, wet weather (May 7-June 8) just prior to the post emergence applications. This weather slowed the growth of the onions and no doubt reduced the buildup of the cuticle which enhanced injury. Onion plants were also in the very early 2 leaf stage when the post applications were made which may be too small for some of these compounds. Diclofop, KK-80 and BAS-9052 OH all show promise for controlling annual grasses in onions. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Table 1. Herbicide treatment evaluations on onions 1980

Treatments[1/]	Rate[2/] lb/A	Onions[3/] %Stand	Onions[3/] %Stunt	Percent Weed Control[4/] HNS May20	HNS Jun19	RPW May20	RPW Jun19	CLQ May20	CLQ Jun19	BYG May20	BYG Jun19
Preplant Incorporated											
Bensulide	4.0	95	0	0	0	91	87	73	72	99	99
Bensulide	6.0	85	0	10	8	92	91	67	64	99	98
DCPA	9.0	85	20	18	11	93	88	100	89	100	99
DCPA	10.0	50	23	55	47	92	84	100	93	99	100
Ethofumesate	2.5	100	0	45	33	99	81	92	82	98	97
Propachlor	6.0	50	13	0	0	86	55	47	27	84	57
Preplant Incorporated + Post Emergence											
DCPA + Acifluorfen	9.0 + 0.5	14	30	99	92	100	97	100	91	99	92
DCPA + Acifluorfen	9.0 + 1.0	3	40	100	97	100	98	100	94	99	89
DCPA + Nitrofen	9.0 + 3.0	44	37	100	96	100	96	100	97	100	85
DCPA + Oxadiazon	9.0 + 0.75	25	77	100	94	100	94	100	100	100	98
DCPA + Oxyfluorfen	9.0 + 0.25	22	57	100	96	100	99	100	98	100	86
Handweeded Check		100	0	100	100	100	100	100	100	100	100
Weedy Check		47	10	0	0	0	0	0	0	0	0

1/ Oxyfluorfen applied with Triton AG-98 at 0.25% v/v.

2/ Rate expressed as lb ai/A.

3/ % stand = % of the handweeded check, % stunt = % growth reduction compared to handweeded check

4/ HNS=hairy nightshade, RPW=redroot pigweed, CLQ=common lambsquarters, BYG=barnyardgrass
May 20 and Jun 19 = dates of evaluation

Table 2. Herbicide treatment evaluations on onions 1980

Treatments[1]	Rate[2] lb/A	Onions[3] %Std	%St	Percent Weed Control[4] HNS May20	Jun19	RPW May20	Jun19	CLQ May20	Jun19	BYG May20	Jun19
Post Emergence											
Acifluorfen	0.75	11	67	100	97	100	98	100	100	42	36
Bromoxynil	0.5	44	20	99	95	99	97	100	87	0	0
Bromoxynil + BAS 9052 OH	0.5 + 0.25	67	20	100	92	100	86	100	91	84	81
Diclofop	1.0	77	3	0	0	21	16	0	0	98	98
Diclofop + Acifluorfen	1.0 + 0.75	17	70	99	94	100	94	100	91	99	93
Diclofop + Bromoxynil	0.75 + 0.5	72	17	100	87	100	86	100	92	97	82
Diclofop + Bromoxynil	1.0 + 0.5	42	27	100	85	100	93	100	92	99	89
Diclofop + Nitrofen	1.0 + 3.0	92	50	100	95	100	89	92	86	96	92
Diclofop + Oxadiazon	1.0 + 0.75	94	17	100	83	99	95	100	100	98	86
KK-80	1.0	92	0	0	0	25	23	0	0	99	97
KK-80 + Bromoxynil	1.0 + 0.5	50	27	100	84	100	86	100	86	99	89
KK-80 + Nitrofen	1.0 + 3.0	64	87	100	79	100	92	100	89	98	95
Nitrofen	3.0	67	18	100	98	100	97	92	89	39	38
Oxadiazon	0.75	58	20	100	100	100	99	100	100	13	11
Oxyfluorfen	0.25	67	70	100	100	100	99	100	100	78	62
Handweeded Check		100	0	100	100	100	100	100	100	100	100
Weedy Check		47	10	0	0	0	0	0	0	0	0

1/ Oxyfluorfen applied with Triton AG-98 at 0.25% v/v, KK-80 applied with ortho surfactant at 0.5% v/v.
2/ Rates expressed as lb ai/A.
3/ Onions %Std=% stand compared to handweeded check, %St=% stunt compared to handweeded check
4/ HNS=hairy nightshade, RPW=redroot pigweed, CLQ=common lambsquarters, BYG=barnyardgrass

Weed control in green onions. Doty, C. H. and K. C. Hamilton. Herbicides were evaluated for weed control and crop selectivity in green bunching onions in 1979 and 1980 at Mesa, Arizona. Southern giant curl mustard seeds were disced into the soil in September for the fall experiment. On October 3, 1979 and April 9, 1980 preplant herbicides were applied to shaped beds and incorporated 3 inches deep with a rototiller-bedshaper. Six rows of White sweet spanish onions were planted on each bed October 4, 1979 and April 21, 1980. On the same dates preemergence herbicides were applied to dry soil and the onions were irrigated by watering every furrow. The first postemergence applications were applied October 25, 1979 and May 19, 1980 when onions had two leaves and weeds had a maximum of four true leaves. Selected plots received a second postemergence application on November 13, 1979 and June 5, 1980 when onions had two or three leaves and weeds were 3 to 6 inches tall. Weeds present in the test begun in the fall include Southern giant curl mustard, nettleleaf goosefoot, common lambsquarters and tumble pigweed. Weeds present in the test begun in the spring include Palmer amaranth, Wright groundcherry, junglerice, common lambsquarters, tumble pigweed, common purslane and red sprangletop. Herbicides were applied in 40 gpa water, except dinoseb and sulfuric acid which were applied in 80 gpa water. Plots were two 40-inch wide beds, 15 feet long, and treatments were replicated four times.

DCPA applied preplant or preemergence and bensulide applied preplant did not adequately control most broadleaf weeds except common purslane. DCPA gave satisfactory control of grass weeds. Applications made preemergence controlled weeds and stunted onions more than preplant applications (Table 2). Oxadiazon generally gave good control of broadleaf weeds, however, a second germination of mustard caused considerable competition with onions prior to harvest in the fall test. Bromoxynil gave excellent control of broadleaf winter annuals and summer annuals, except common purslane. Sulfuric acid gave excellent control of all broadleaf weeds when applied twice during the early stages of onion growth. None of the postemergence herbicides controlled annual grasses satisfactorily.

Combinations of DCPA preplant or preemergence with postemergence herbicides gave good-to-excellent control of all annual weeds. Stunting and/or stand reduction of onions from these combinations was often unacceptable, as indicated by the lower yield of marketable onions in the fall test (Table 1).

Applications of glyphosate with a rope wick could not be done effectively without severely injuring the onions. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721.)

Table 1

Response of weeds and onions to preplant, preemergence

and postemergence herbicides applied in the fall

Treatment		Weed control and onion injury Percent estimated				Yield of marketable onions
		Broadleaf		Onion		
Herbicide[1/]	lb/A or %	Nov.	Jan.	Nov.	Jan.	No./10 ft.bed
DCPA (PP) + Glyphosate (Post-Wick)[2/]	8.0 + 9%	33	97	21	69	-
Bensulide (PP) + Glyphosate (Post-Wick)	6.0 + 9%	25	89	30	77	-
Propham (PE) + Glyphosate (Post-Wick)	4.0 + 9%	26	86	11	61	-
Oxadiazon (Post)	1.0	83	55	9	0	283
Bromoxynil (Post)	0.25	98	91	18	25	396
Sulfuric acid (Post-twice)	5%	90	75	10	8	342
DCPA (PP) + Oxadiazon (Post)	8.0 + 1.0	92	80	25	53	192
Bensulide (PP) + Oxadiazon (Post)	6.0 + 1.0	82	61	23	57	129
DCPA (PP) + Bromoxynil (Post)	8.0 + 0.25	100	100	71	94	46
DCPA (PP) + Sulfuric acid (Post-twice)	8.0 + 5%	97	93	36	65	179
DCPA (PP) + Dinoseb (Post)	8.0 + 1.0	97	95	87	98	-
Glyphosate (Post-Wick)	9%	0	81	0	71	199

1/ PP = Preplant, PE = Preemergence, Post = Postemergence to crop and weeds.

2/ A solution of glyphosate: water, 1:3, was applied to weeds over-the-top of onions with a hand-held rope wick on November 19 and December 18, 1979.

Table 2

Response of weeds and onions to preplant, preemergence and postemergence herbicides applied in the spring

Treatment		Weed control and onion injury Percent estimated in June		
Herbicide[1/]	lb/A or %	Broadleaf	Grass	Onion
Oxadiazon (Post)	1.0	85	55	20
Bromoxynil (Post)	0.125	5	5	33
Sulfuric acid (Post)	5%	69	10	33
DCPA (PP) + Oxadiazon (Post)	8.0 + 1.0	96	84	31
DCPA (PE) + Oxadiazon (Post)	8.0 + 1.0	95	95	48
DCPA (PE) + Oxadiazon (Post-twice)	8.0 + 0.5	98	90	55
DCPA (PP) + Bromoxynil (Post)	8.0 + 0.125	68	64	49
DCPA (PE) + Bromoxynil (Post)	8.0 + 0.125	79	79	58
DCPA (PE) + Bromoxynil (Post-twice)	8.0 + 0.125	90	74	51
DCPA (PP) + Sulfuric acid (Post-twice)	8.0 + 5%	94	73	38
DCPA (PE) + Sulfuric acid (Post-twice)	8.0 + 5%	97	83	58
DCPA (PE) + Hand weed	8.0	94	94	49

1/ PP = Preplant, PE = Preemergence, Post = Postemergence to crop and weeds.

A comparison of timing of initial weeding on honeydew melons and pickling cucumbers. Elmore, C.L., J.T. Woods and C.V. Weakley. A trial was established on a Yolo loam soil at the U.C. Davis campus to evaluate the timing of initial weeding of cucurbits as it relates to subsequent yield reduction. Included in this trial were honeydew melons and pickling cucumbers which were both plug planted and direct seeded. Plots were 15 feet long by 5 feet wide replicated four times, and were laid out in a split plot design with the cucurbit varieties being the main plots and combinations of planting methods and time of initial weeding being the subplots.

In the plug planted subplots, 60 milliliter peat-vermiculite plugs were placed 10 inches apart with an average of 2 seeds present in each plug. The direct seeded cucurbits were planted 1.25 inches deep with an average of 6 seeds per linear foot of row. The trial was first sprinkler irrigated on June 24, 1980 and this method of irrigation was continued until July 31 when furrow irrigation was begun. Weed populations in this trial were moderate to heavy with barnyardgrass being the primary species although tumble pigweed was also present. Target times for initial weeding were 0, 2, and 4 weeks after crop emergence. The cucurbit seedlings emerged over a week long period, so it was decided to first weed the 0-week subplots on July 5 with the 2-week and 4-week subplots following on July 17 and July 28, respectively. All plots were kept weed-free after their initial weeding.

From the following table, it can be seen that delaying the initial weeding can easily result in yield reductions. The cucumbers appeared to be more susceptible to this early-season weed competition than did the melons; and substantial, although not statistically significant, yield reductions occurred even when weeding was only delayed 2 weeks after emergence. This would seem to indicate that growers should not delay their initial cultivation and/or hand weeding much beyond one week after crop emergence especially with less vigorous cucurbits such as cucumbers.

The comparison between planting methods in this trial was somewhat inconclusive; although, on the average, the plug planted cucurbits yielded slightly more than those direct seeded. Of interest in the honeydew yield data was that, although the overall yield between plug and direct seeded was not substantially different, a greater percentage of the yield in the plug planted plots was made up of larger melons. This same general trend can be seen in the cucumber data, but it is not as obvious. A possible explanation for this greater percentage of large fruit in the plug planted plots is that this planting method may increase the earliness of fruit maturity, thus resulting in larger fruit when harvested on the same date as the direct seeded plots. (University of California Cooperative Extension, Davis, CA 95616)

The effect of timing of initial weeding on honeydew melons and pickling cucumbers

Planting method	Initial weeding	Vigor rating 1/	Honeydew melons: Total yield 2/	Percent yield 3/: small	medium	large
plug	0-weeks	8.3	62,944	1.8	42.1	56.1
plug	2-weeks	8.8	51,836	3.6	54.1	42.3
plug	4-weeks	5.0	44,939	7.6	73.8	18.6
direct	0-weeks	7.8	58,516	6.5	77.3	16.2
direct	2-weeks	8.0	61,492	8.5	70.5	21.0
direct	4-weeks	4.5	30,129	20.7	68.9	10.4
			$LSD_{.05}$=16,771			

Planting method	Initial weeding	Vigor rating 1/	Pickling cucumbers: Total yield 2/	Percent yield 4/: 2's	4's	6's	Yield value 5/
plug	0-weeks	8.5	15,086	4.6	16.9	29.2	$361.55
plug	2-weeks	7.3	10,179	4.3	12.7	29.2	210.54
plug	4-weeks	4.3	4,559	3.5	30.3	20.8	143.75
direct	0-weeks	9.0	14,244	7.3	16.8	28.6	384.78
direct	2-weeks	7.8	10,338	8.8	20.5	17.6	345.58
direct	4-weeks	3.8	2,802	5.2	18.1	21.8	78.41
			$LSD_{.05}$= 5,912				$LSD_{.05}$=202.70

1/ rated 0-10 on August 12, 1980; 10 = most vigorous.
2/ yield per acre for once-over harvest; melons harvested on October 16, 1980 and cucumbers on August 20, 1980.
3/ small: 1½-4 inches; medium: 4-6 inches; large: 6-8 inches in length.
4/ three of six size grades are listed; 1's = smallest, 6's = largest.
5/ value in dollars per acre based on 1979 commercial prices for grades 1-4.

The effect of preplant incorporated herbicides on honeydew melons and pickling cucumbers. Elmore, C.L., J.T. Woods and C.V. Weakley. A trial was established on a Yolo loam soil at the U.C. Davis campus to evaluate the performance of selected herbicides on honeydew melons and pickling cucumbers. Plots were 15 feet long by 10 feet (two beds) wide and were laid out in a randomized complete block design with four replications per treatment. Herbicides were applied on June 20, 1980 and were incorporated shortly afterwards to a 1.5 inch depth with two passes of rolling cultivators. The two varieties of cucurbits were planted 1.25 inches deep on alternate beds on June 22. Approximately 6 seeds per linear foot were planted of both the melons and cucumbers. The trial was first sprinkled on June 24 and this method of irrigation was continued until July 31 when furrow irrigation was begun. The weeded control plots were initially weeded on July 5 while all the herbicide treated plots were first weeded on July 18.

Results from the following tables indicate that barnyardgrass, the principal weed present, was adequately controlled with most treatments except for napropamide at 1.0 and 2.0 lb ai/A and naptalam at 6.0 lb ai/A. Very few of the herbicides tested were shown to be safe on pickling cucumbers in this trial. Only three treatments did not give significantly (95% confidence) reduced yields as compared to the weeded check. These were chloramben at 6.0 lb ai/A, naptalam at 6.0 lb ai/A, and the combination of naptalam and bensulide at 3.0 plus 3.0 lb ai/A respectively. Napropamide, pendimenthalin, and trifluralin at the rates tested all reduced stand and vigor of the cucumbers which resulted in significantly reduced yields.

Overall, honeydew melons showed a much greater tolerance to the herbicides tested than did the cucumbers. Although no herbicide treatment equaled the weeded check in yield, the only statistically significant reductions occurred with pendimenthalin, trifluralin, alanap at 6.0 lb ai/A, and the 2 lb ai/A rate of napropamide 4 F. In the case of pendimethalin and trifluralin, this was associated with a substantial reduction in stand. (University of California Cooperative Extension, Davis, CA 95616)

Table 1: The effect of preplant herbicides on pickling cucumbers

Herbicide	Ai/A	Barnyard-grass control1/	Stand count2/	Vigor rating3/ 7/7/80	Vigor rating3/ 8/12/80	Yield value4/
napropamide (4F)	1.0	6.8	25.2	5.8	5.0	$ 229.42
napropamide (4F)	2.0	8.8	18.2	7.2	3.3	78.41
napropamide (2EC)	2.0	6.8	20.8	5.0	3.5	185.86
napropamide (2EC)	4.0	10.0	10.8	3.0	1.5	30.49
pendimethalin	0.74	9.3	13.5	3.8	6.3	258.10
pendimethalin	1.5	9.6	6.8	3.0	3.5	169.88
trifluralin	0.75	9.0	24.2	6.3	5.5	213.44
trifluralin	1.5	9.5	12.2	4.0	1.8	37.59
naptalam	6.0	6.8	27.2	7.8	6.5	323.80
naptalam + diclofop	6.0 + 2.0	10.0	24.2	6.0	6.5	251.20
naptalam + bensulide	3.0 + 3.0	8.3	33.0	6.5	8.5	367.36
chloramben	3.0	8.0	12.0	5.3	4.8	226.51
chloramben	6.0	7.5	27.0	5.5	8.0	399.30
control (hoed)	-	9.3	30.8	9.0	9.0	406.56
control (hot hoed)	-	2.8	30.0	8.8	5.5	40.66
			$LSD_{.05}$ = 14.3			$LSD_{.05}$ = 141.7

1/ rated 0-10 on July 7, 1980; 10 = complete control.
2/ per 15 feet of bed.
3/ rated 0-10 on the two dates listed; 10 = most vigorous.
4/ value in dollars per acre for once-over harvest on August 20, 1980; figures based on 1979 commercial prices for grades 1-4.

The effect of preplant herbicides on honeydew melons

Table 2:

Herbicide	Ai/A	Barnyard-grass control[1/]	Stand count[2/]	Vigor rating[3/] 7/7/80	Vigor rating[3/] 8/12/80	Yield value[4/]
napropamide (4F)	1.0	6.8	34.2	6.8	8.0	65,805
napropamide (4F)	2.0	6.8	29.5	5.8	8.8	57,964
napropamide (2EC)	2.0	6.8	33.8	6.2	8.0	61,158
napropamide (2EC)	4.0	10.0	22.2	4.2	6.0	63,249
pendimethalin	0.75	9.3	19.5	5.5	7.5	55,234
pendimethalin	1.5	9.6	10.0	3.0	4.0	36,474
trifluralin	0.75	9.0	13.8	4.5	6.3	56,744
trifluralin	1.5	9.0	12.0	4.5	4.5	45,825
naptalam	6.0	6.8	31.5	7.3	8.3	55,699
naptalam + diclofop	6.0 + 2.0	10.0	26.2	7.0	8.0	64,422
naptalam + bensulide	3.0 + 3.0	8.3	39.0	9.3	9.5	64,817
chloramben	3.0	8.0	24.0	6.8	7.8	61,158
chloramben	6.0	7.5	26.0	6.3	9.3	68,709
control (hoed)	-	9.3	30.0	8.5	9.5	74,517
control (not hoed)	-	2.8	39.5	8.3	4.8	4,530
			$LSD_{.05}$= 18.0			$LSD_{.05}$=14,856

1/ rated 0-10 on July 7, 1980; 10 = complete control.
2/ per 15 feet of bed.
3/ rated 0-10 on the two dates listed; 10 = most vigorous.
4/ yield per acre of melons 4 inches and greater as measured lengthwise; once-over harvest on October 17, 1980.

Vegetation management practices for desert melon production. Cudney, D. W., C. E. Bell, H. Johnson, Jr., K. S. Mayberry and A. H. Lange. An herbicide investigation was established on March 4, 1980, at the University of California Imperial Valley Field Station of southern California. The goal of the trial was to compare currently registered cantaloupe herbicides and promising candidate herbicides on both flat and slanted beds utilizing different methods of incorporation. Bensulide, naptalam, bensulide + naptalam, napropamide and ethafluralin were compared in a randomized complete block design with 4 replications. The soil type was an Imperial clay with less than .5% organic matter. The two bed configurations were a flat 60-inch bed and a slanted south-sloping 80-inch bed. The cantaloupe variety used for the trial was Topmark. All herbicide treatments were made using a CO_2 backpack sprayer with 8003 LP nozzles at 18 psi. The spray volume was 30 gal/A. For the slanted beds, two types of treatments were made: the herbicides were incorporated with a Lilliston rolling cultivator 2 inches deep or applied as preemergence treatments after planting. For the flat-planted beds, the herbicides were applied as preemergence treatments, as power-incorporated treatments (incorporated 3 inches deep), or as Lilliston-incorporated treatments (incorporated 2 inches deep). The cantaloupes were established in each plot both by plug planting utilizing 100-ml plugs with 7% activated charcoal, 47% peat and 46% vermiculite, and direct seeding.

Ratings were made for vigor 1 month after planting, and 5 consecutive plant samples were taken per plot 2½ months after planting for fresh weight determination.

Ethafluralin and napropamide were phytotoxic to melons, particularly when applied as power-incorporated treatments. Plug planting utilizing activated charcoal to adsorb the herbicide in the area of cantaloupe germination safened the use of napropamide and ethafluralin. Naptalam produced some phytotoxicity, notably stunting, and reduced initial growth for all methods of application; however, this effect was nullified with plug planting. Rainfall occurred after the initiation of the plots, which could account for the increase in phytotoxicity with naptalam seen this year which had not been recorded in previous trials the last 3 years. It appears that ethafluralin is too phytotoxic for use unless plug planting is utilized. Napropamide can also give stunting, particularly when power incorporated.

Plug planting allows the use of herbicides which might normally have adverse effects on melons; however, the cost of plug planting versus the benefits in weed control would have to be evaluated. (University of California Cooperative Extension and Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

Vegetation management practices for desert melon production

FLAT BEDS

Preemergence	Vigor Ratings* Plug Planted	Vigor Ratings* Direct Seeded	Plant Fresh Weight** Plug Planted	Plant Fresh Weight** Direct Seeded
1. Bensulide	8.50	9.25	1508.50	1415.25
2. Naptalam	8.75	7.00	1789.00	1352.50
3. Bensulide + naptalam	8.75	7.25	1561.50	1352.25
4. Napropamide	9.00	9.50	1337.25	1442.50
5. Ethafluralin	9.75	8.50	1150.25	1653.00
6. Check	9.00	9.25	1386.50	1383.50
Power Incorporated				
1. Bensulide	9.50	8.25	1377.25	1643.70
2. Naptalam	9.00	6.00	1355.50	1225.50
3. Bensulide + naptalam	8.75	6.00	1186.00	1150.00
4. Napropamide	9.00	3.00	1614.25	837.50
5. Ethafluralin	9.00	4.00	1531.75	808.75
6. Check	9.50	8.00	1529.75	1348.25
Lilliston				
1. Bensulide	9.00	7.75	1404.25	1591.50
2. Naptalam	9.00	5.75	1356.75	1352.50
3. Bensulide + naptalam	9.00	5.75	1463.75	1318.25
4. Napropamide	8.75	6.75	1484.50	1283.50
5. Ethafluralin	9.00	6.25	1551.50	1429.25
6. Check	9.75	7.50	1865.50	1407.00

SLANT BEDS

	Vigor Ratings* Preemergence	Vigor Ratings* Lilliston	Plant Fresh Weight** Preemergence	Plant Fresh Weight** Lilliston
1. Bensulide	9.00	8.50	1584.75	1604.25
2. Naptalam	7.75	5.75	1152.75	1187.50
3. Bensulide + naptalam	8.50	7.25	1167.50	1445.75
4. Napropamide	6.00	2.75	1222.75	345.25
5. Ethafluralin	8.25	4.25	1408.75	575.75
6. Check	9.50	7.75	1383.75	1581.00

*Vigor Ratings: 10 = good vigor, 0 = no stand or vigor; ratings made 4/1/80.
**Plant Fresh Weight: grams of vine, 5 per plot taken on 5/15/80.

Evaluations of herbicide treatments for weed control in sweet corn. Brenchley, R. G. and D. L. Zamora. Herbicide evaluation trials were established near Parma, Idaho to evaluate potential herbicides for weed control in sweet corn. Herbicide applications were made May 1, 1980 (preplant incorporated), May 2, 1980 (preemergence) and June 9, 1980 (post emergence). Environmental conditions at the time of application were as follows: (May 1, 1980, air temperature 53 F, soil temperature 65 F, relative humidity 20%, wind SE 1 mph, cloud cover 0%, soil surface dry to 3 inches), (May 2, 1980, air temperature 66 F, soil temperature 63 F, relative humidity 21%, wind SE 2 mph, cloud cover 90%, soil surface dry to 3 inch depth), (June 9, 1980, air temperature 76 F, soil temperature 66 F, relative humidity 23%, wind SW 4 mph, cloud cover 30%, soil surface moist). Soil type was a silt loam, 1.2% organic matter, pH 7.2, CEC 15 meq. Plot size was 8 by 35 ft. Treatments were replicated three times in a randomized complete block design. Herbicides were applied using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 28 psi pressure with a delivery rate of 27 gpa total volume. Preplant incorporated treatments were incorporated using a Lely Roterra set at a five inch depth. Sweet corn (variety Golden Jubilee) was seeded at 2 to 3 inches deep on 36 inch row spacings on May 1, 1980. Corn yields were taken by harvesting the center row out of a three row plot on August 22, 1980.

Rainfall amounts consisted of .14 inches on May 10, .73 inches on May 15 to 16, 1.15 inches on May 23 to 29, .28 inches on June 2, .22 inches on June 4, .20 inches on June 12 to 13, .09 inches on June 24, .11 inches on July 3 to 4, .10 inches on August 18. Plots were furrow irrigated on May 6, June 10, June 23, July 2, July 14, July 24, and August 5, 1980.

Weed species present and their density per sq. ft. in the weedy check, measured six inches on either side of the corn row were hairy nightshade 22, redroot pigweed 32, barnyardgrass 13, and common lambsquarters 0.8. Weed control evaluations were taken June 2 and June 20, 1980.

Treatments which resulted in 90% plus control of hairy nightshade, redroot pigweed, barnyardgrass and common lambsquarters with yields comparable to the handweeded check were alachlor + atrazine, alachlor + cyanazine, alachlor + bromoxynil, metolachlor + atrazine and metolachlor + cyanazine. Bromoxynil applied post emergence to sweet corn provide excellent annual broadleaf control but caused substantial leaf burn on the crop; however, the corn rapidly recovered and produced some of the better yields in the experiment. Results from this experiment indicate the need and advantages of herbicide combinations for broad-spectrum, full-season weed control. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Table 1. Herbicide treatment results on sweet corn, 1980

					Percent Weed Control[3/]							
	Rate[1/]	Crop Injury[2/]			HNS		RPW		BYG		CLQ	Yield[4/]
Treatments	lb/A	%Std	%St	%Def	Jun2	Jun20	Jun2	Jun20	Jun2	Jun20	Jun20	T/A
Preplant Incorporated												
PPG-844	0.75	89	0	13	94	91	99	96	39	25	86	2.00
PPG-844	1.5	83	0	7	97	94	100	98	87	81	95	3.00
PPG-225	0.5	100	0	11	97	82	98	90	47	28	92	4.45
PPG-225	1.0	38	30	0	99	87	97	92	86	69	95	3.28
PPG-844 + Butylate	0.5 + 3.0	93	0	0	77	72	98	95	87	83	75	2.56
RE-28269	1.5	100	12	10	72	68	72	73	98	90	62	3.14
RE-28269	3.0	93	26	18	93	82	96	87	96	88	64	3.62
SN-80786	1.5	100	0	0	77	65	96	90	96	90	77	4.16
SN-80786	3.0	55	43	50	92	90	91	84	100	92	82	2.56
Cycloate	4.0	100	0	5	93	87	90	82	91	87	96	1.79
Vernolate +	3.0	100	0	0	44	35	92	91	91	90	97	3.59
Vernolate +	4.0	94	0	0	67	52	99	98	100	97	99	3.33
Alachlor	3.0	100	0	11	97	82	100	93	100	82	78	3.86
Alachlor + Atrazine	2.0 + 1.0	100	0	0	100	100	100	100	99	95	100	4.81
Alachlor + Cyanazine	2.0 + 1.2	100	0	0	100	98	100	96	100	98	99	4.74
Metolachlor	2.5	94	0	0	95	87	100	95	99	92	82	2.73
Metolachlor + Atrazine	1.5 + 0.6	100	0	0	100	98	99	98	95	92	92	4.79
Metolachlor + Atrazine	1.5 + 0.8	94	0	0	100	100	100	100	99	95	100	4.68
Metolachlor + Atrazine	1.5 + 1.0	94	0	0	100	100	100	100	100	97	100	5.97
Metolachlor + Cyanazine	1.5 + 1.2	89	0	0	100	100	100	97	96	94	100	4.25
Pendimethalin	1.0	55	22	0	64	62	91	87	100	98	94	1.48
Handweeded Check		100	0	0	100	100	100	100	100	100	100	4.84
Weedy Check		100	10	0	0	0	0	0	0	0	0	1.04

1/ All rates are expressed as ai/A.
2/ Crop injury Std=Stand, St=Stunt, Def=Deformed or abnormal plants
3/ HNS=hairy nightshade, RPW=redroot pigweed, BYG=barnyardgrass, CLQ=common lambsquarters
4/ T/A=tons/acre

Table 2. Herbicide treatment results on sweet corn, 1980

	Rate[1/]	Crop Injury[2/]			Percent Weed Control[3/]							Yield[4/]
					HNS		RPW		BYG		CLQ	
Treatments	lb/A	%Std	%St	%Def	Jun2	Jun20	Jun2	Jun20	Jun2	Jun20	Jun20	T/A
Preemergence												
PPG-844	0.75	89	0	0	97	92	99	97	39	35	82	1.60
PPG-844	1.5	89	0	0	100	99	100	98	43	41	87	4.38
Sequential (Preplant Incorporated + Post Emergence)												
Alachlor + Bromoxynil	3.0 + 0.5	100	10	20	99	100	100	100	100	85	100	6.38
Butylate + Bromoxynil	4.0 + 0.5	94	10	20	51	100	93	100	87	84	100	4.64
Post Emergence												
PPG-844	0.125	94	11	10		45		60		0	0	1.62
PPG-844	0.25	100	10	30		88		95		7	0	2.22
PPG-844	0.5	100	30	40		93		98		11	6	2.05
PPG-844	1.0	94	33	70		97		98		22	11	1.83
PPG-225	0.5	100	10	10		55		24		0	95	3.14
PPG-225	1.0	100	15	30		62		68		0	100	2.29
Bromoxynil	0.67	94	22	80		92		93		0	100	3.94
Bentazon	0.75	94	15	0		92		45		7	94	1.48
Handweeded Check		100	0	0	100	100	100	100	100	100	100	4.84
Weedy Check		100	10	0	0	0	0	0	0	0	0	1.04

1/ All rates are expressed as ai/A.

2/ Crop injury Std=Stand, St=Stunt, Def=Deformed or abnormal plants

3/ HNS=hairy nightshade, RPW=redroot pigweed, BYG=barnyardgrass, CLQ=common lambsquarters

4/ T/A=tons/acre

Evaluation of a herbicide antidote (R-25788) with cycloate on sweet corn. Brenchley, R. G. and D. L. Zamora. A field study was established near Parma, Idaho to evaluate the effectiveness of R-25788 as a possible herbicide antidote agent for cycloate when used on sweet corn. Treatments were applied on May 1, 1980 when the following environmental conditions existed: air temperature 50 F, soil temperature 63 F, relative humidity 22%, cloud cover 0%, wind SE 1 mph, soil surface was dry to 3 inches. Soil type was a silt loam, 1.2% organic matter, pH 7.2, CEC 15 meq. Plot size was 8 by 35 ft. Treatments were replicated four times in a randomized complete block design. Herbicides were applied using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 28 psi pressure with a delivery rate of 27 gpa total volume. Treatments were incorporated using a Lely Roterra set at a depth of five inches. Sweet corn (variety: Golden Jubilee) was seeded at a 2 to 3 inch depth on 36 inch row spacings on May 1, 1980. Corn yields were taken by harvesting the center row out of a three row plot on August 22, 1980.

Rainfall amounts consisted of .14 inches on May 10, .73 inches on May 15 to 16, 1.15 inches on May 23 to 29, .28 inches on June 2, .22 inches on June 4, .20 inches on June 12 to 13, .09 inches on June 24, .11 inches on July 3 to 4, .10 inches on August 18. Plots were furrow irrigated on May 6, June 10, June 23, July 2, July 14, July 24, and August 5, 1980.

Weed species present and their density per sq. ft. in the weedy check, measured six inches on either side of the corn row were hairy nightshade 22, redroot pigweed 32, barnyardgrass 13, and common lambsquarters 0.8. Weed control evaluations were taken June 2 and June 20, 1980.

Treatment1/	Rate2/ ai/A	Crop Injury3/ %Std	%St	%Def	Percent Control4/ HNS	PW	BYG	Yield5/ T/A
Cycloate	3.0	89	0	0	93	79	85	2.40
Cycloate	4.0	100	0	5	93	90	91	1.79
Cycloate	6.0	100	0	0	100	96	98	3.16
Cycloate + R-25788	3.0	94	0	0	69	58	83	1.69
Cycloate + R-25788	4.0	94	0	0	94	91	90	2.44
Cycloate + R-25788	6.0	100	0	0	99	99	96	2.48
Handweeded Check		100	0	0	100	100	100	4.84
Weedy Check		100	10	0	0	0	0	1.04

1/ Cycloate + R-25788 ratio was 6:0.5
2/ Rate expressed as ai/A
3/ Std=stand, St=stunt, Def=deformed or abnormal plants
4/ HNS=hairy nightshade, PW=redroot pigweed, BYG=barnyardgrass
5/ T/A=tons per acre

The results of this experiment are inconclusive since cycloate without antidote did not cause significant crop injury. When comparing the cycloate 4.0 lb/A with cycloate + R-25788 at 4.0 lb/A it appears that R-25788 had some safening affect. However, at the 6 lb/A rate of cycloate without R-25788 where one would expect crop injury there was no crop injury. It should also be noted that cycloate + R-25788 at 3 lb/A the weed control ratings were somewhat reduced compared to cycloate 3 lb/A which may indicate some antagonistic reaction. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Control droplet application trial. Cudney, D. W., L. S. Jordan and R. Russell. The effects of varying spray volume and additives were evaluated for glyphosate applications on malva spp. at the University of California Riverside experimental farm. Malva spp. have shown resistance to glyphosate applications and therefore was selected as an indicator species for the following trial. Two lbs of the commercial preparation of the isopropylamine salt of glyphosate were compared at 1, 2, 4 and 30 gpa spray volume. Additions of surfactant, nonphytotoxic oil and ethrel were also compared. Applications with a hand-held "Herbi" applicator were also compared utilizing 10, 20 and 50% glyphosate solutions and a spray volume of 1 gpa. The 1, 2 and 4 gpa applications were made using a "Micro Max" control droplet (250 microns) applicator head. The 30 gpa application was made using a CO_2 backpack sprayer with 8003 nozzles and 30 psi. The malva spp. was in the 6-leaf stage at the time of application.

Ratings were made for malva spp. control 8, 12 and 20 days after application. Weed control improved with time; however, there was a distinct advantage for the low volume applications. The "Micro Max" control droplet head gave ratings of 9 or above after 20 days, whereas the standard 30 gpa application gave a control rating of only 3.3. The additives used in this trial did not benefit control. The "Herbi" applicator did not give as much control as the "Micro Max" plots at comparable glyphosate applications. Nettleleaf goosefoot was controlled by all treatments except the 30 gallon application and the 10% "Herbi" application. (University of California Cooperative Extension, and Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

Treatment	Nettleleaf Goosefoot Control 9/26/80	Malva spp Control 9/26/80	Malva spp Control 9/30/80	Malva spp Control 10/7/80
1. 2 lbs glyphosate @ 1 gal/A	9.8	6.5	8.5	9.6
2. 2 lbs glyphosate @ 2 gal/A	10.0	6.0	7.8	9.3
3. 2 lbs glyphosate @ 4 gal/A	9.8	5.3	6.0	9.0
4. 2 lbs glyphosate @ 30 gal/A	7.5	2.5	2.8	3.3
5. 2 lbs glyphosate + 2 qts X77 @ 2 gal/A	10.0	6.5	8.0	9.6
6. 2 lbs glyphosate + 2 qts nonphytotoxic oil @ 2 gal/A	10.0	6.5	7.8	9.6
7. 2 lbs glyphosate + 5% ethrel @ 2 gal/A	9.8	4.8	6.0	7.9
8. 2 lbs glyphosate + 2 qts surfactant + 5% ethrel @ 2 gal/A	9.8	4.8	6.3	8.4
9. 10% glyphosate formulation @ 1 gal/A "Herbi"	6.8	2.0	2.0	2.8
10. 20% glyphosate formulation @ 1 gal/A "Herbi"	8.8	3.8	4.0	4.5
11. 50% glyphosate formulation @ 1 gal/A "Herbi"	9.5	4.5	5.8	7.0
12. Control	0	0	0	0

0 = no control, 10 = all plants dead.

Evaluation of herbicides for controlling common mallow. Jordon, L. S., and R. C. Russell. A study was conducted at the UCR Experiment Station to evaluate two potential herbicides for control of common mallow. Test plots were located in a portion of a field with a solid stand of mallow 4 to 6 inches tall. Two herbicides, oxyfluorfen and glyphosate were applied separately and in combination as postemergence treatments using a constant pressure CO_2 sprayer with a 3 nozzle spray boom. Treatments were made at a spray volume of 100 gpa. All spray solutions contained a surfactant, X-77, at a concentration of 0.25 percent.

Treatments were made on February 24, 1978 and plots were observed for 4 weeks. The response of malva to oxyfluorfen was rapid with a nearly complete kill within 10 days of treatment. Glyphosate treatments were much slower acting and less effective on an equal rate comparison. Combination treatments of glyphosate and oxyfluorfen were no more effective than treatments with oxyfluorfen applied alone. (Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

Effect of herbicides on control of mallow.

Herbicides 1/	Rate lb ai/A	Control of malva 2/ 3/ 3/10/78	3/24/78
Oxyfluorfen	0.5	10	10
Oxyfluorfen	1.0	10	10
Oxyfluorfen	7.0	10	10
Glyphosate	0.5	1.3	3.5
Glyphosate	1.0	2.5	5.5
Glyphosate	2.0	5.3	8.0
Glyphosate + oxyflourfen	0.5 + 0.5	9.8	10
Glyphosate + oxyfluorfen	0.5 + 1.0	10.0	10
Glyphosate + oxyfluorfen	1.0 + 0.5	9.9	10

1/ Treatments applied February 24, 1978.
2/ Average of 4 replicates.
3/ Scale: 0 = no control, 10 = all plants dead.

Control of yellow nutsedge in seeded chile peppers. Anderson, W. Powell and Gary Hoxworth. Infestations of yellow nutsedge in chile pepper (var. New Mexico 6) research plots were controlled 95 percent or more season-long with metolachlor applied at 2 and 3 lb ai/A preemergence to the nutsedge. Dosages of 1 and 1.5 lb ai/A were much less effective. Applied to a clay-loam soil preplant (soil incorporated about 1 inch with a power-tiller) to seeded chile, metolachlor appeared to cause no adverse effects to the chile plants at any of these dosages. However, applied at 2 lb ai/A on a sandy soil the chile plants did appear to be stunted and the chile stand severely reduced. In each case, the chile plants were grown under conditions of furrow irrigation.

Applied postemergence, over-the-top, to chile plants during the growing season at 3 lb ai/A, metolachlor did not appear to cause adverse effects on the chile plants when so treated at several stages of growth (3 to 12 inches tall). The treatments were applied in the equivalent of 52 gal/A of water as a broadcast spray using a bicycle-type plot sprayer. Such postemergence treatments applied to clean-tilled ground known to be heavily infested with yellow nutsedge resulted in 95 percent or better suppression of nutsedge emergence for 6 weeks and longer. The herbicide treatments were applied just prior to furrow irrigation.

In summary, metolachlor appears to be a promising herbicide for use in chile peppers for the selective control of yellow nutsedge. (Agr. Expt. Sta., New Mexico State University, Las Cruces, N. M. 88001.)

Weed control with preplant trifluralin in direct-seeded chile peppers. Anderson, W. Powell and Gary Hoxworth. Trifluralin is labeled as a pre-transplant herbicide for peppers, but it is not labeled as a preplant treatment for direct-seeded peppers (chile or bell).

In 1980, trifluralin was applied March 19 at 0.75 and 1.0 lb ai/A to the surface of preshaped plant beds and soil incorporated about 1-inch deep with a power-tiller mounted ahead of a bed-shaper. Following reshaping the beds, a single row of chile peppers (var. New Mexico 6) was seeded in each plant bed and the soil watered by furrow irrigation. Thereafter, the crop was water as needed via furrow irrigation. Each treatment was replicated 3 times and individual plots were 10 ft wide (3 plant beds) by 30 ft long.

Visual evaluations recorded July 23, 1980, indicated that neither dosage of trifluralin adversely affected the growth of the chile pepper plants. Yield data were not obtained from the treated plants but indications were that flowering and pod-set were not adversely affected.

The trifluralin treatments controlled barnyardgrass (one of the principal weeds present) better than 90 percent. Weeds not controlled in the treated areas were Wright groundcherry and yellow nutsedge; these weeds severely competed with the chile plants and would have to be removed in order to produce a marketable crop.

In summary, trifluralin appears to be a promising selective herbicide for direct-seeded chile pepper when applied preplant, soil incorporated. However, weed species tolerant to trifluralin may have to be controlled by cultivation or other means to reduce their adverse competititive effects on the crop plants. (Agr. Expt. Sta., New Mexico State University, Las Cruces, N. M. 88001.)

The effect of two selective graminicides in potatoes on current-season resprouting of quackgrass rhizome buds. Callihan, R. H. and P. W. Leino. RO138895 and BAS 9052 were evaluated for postemergence control of quackgrass (*Agropyron repens*) in potatoes.

Single applications of rates from 1.25 to 2.0 lb ai/A of these herbicides were made to emerged quackgrass in a late-planted commercial field of budding Russet Burbank potatoes on July 23, 1980. Treatments were applied with a tractor-mounted broadcast sprayer equipped with eight 8005 nozzles operating at 25 psi at 3 mph, calibrated to deliver 35 gpa by compressed air. The air temperature was 93 F and the dry-surfaced Declo loam was 106 F at its surface. A randomized complete block design with 12 feet by 40 feet plots and four replications was employed.

Due to an inconsistent stand of quackgrass the efficacy of the chemicals was evaluated by collecting samples of the treated rhizomes. After these rhizomes were sprouted in a growth chamber, the sprouted nodes were counted. Virtually no sprouting occurred in rhizomes taken from plots treated with RO138895 at the one and two pound rates. Rhizomes treated with either RO138895 or BAS 9052 exhibited more inhibition of sprouting as the dosage was increased.

No symptoms of either herbicide were found on potato plants. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

The effect of graminicides on quackgrass rhizome buds

Herbicide	lb/A	Rhizome sprouting (%)[1/] 1 week	2 weeks	3 weeks
Check	-	36	41	43
BAS 9052	0.25	12	16	18
BAS 9052	0.50	13	16	16
BAS 9052	1.00	5	5	5
BAS 9052	2.00	2	3	3
RO138895	0.25	5	8	8
RO138895	0.50	1	2	4
RO138895	0.75	2	2	2
RO138895	1.00	0	0	0
RO138895	2.00	0	0	0
LSD 5%		8	9	9

[1/] Percent of sprouted buds per 59 nodes after one, two, and three weeks of incubation.

Tolerance of potatoes to selective postemergent grass herbicides. Callihan, R. H. and P. W. Leino. Tolerance of sprinkler-irrigated Russet Burbank potatoes to RO138895 and BAS9052 grass herbicides was evaluated.

Herbicides were applied in four replicates on June 23, 1980 to 8 to 12 inch potatoes growing on a wet surfaced Declo fine sandy loam. Temperature on the soil surface was 63 F and the air temperature was 59 F. The second application of the split application treatments was applied three weeks later with the soil surface temperature being 78 F and the air temperature 72 F. All applications were made with a tractor-mounted broadcast sprayer equipped with eight 8005 nozzles operating at 25 psi at 3 mph, calibrated to deliver 35 gpa by compressed air. Weeds were eliminated from all plots with Treflan and Eptam and by hand pulling escaped plants.

Observations during the growing season provided no visual evidence of injury. Evaluation of tubers harvested at the end of the season provided no systematic evidence of any influence of these two herbicides on crop yield or fresh-market quality. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Response of potatoes to graminicides

Herbicide	Application date 1/		Yield of harvested tubers 2/			Number of tubers >4 oz
	June 25	July 18	<4 oz	>4 oz	Total	
RO138895	0.00	0.00	26.3	73.95	100.2	166
RO138895	0.25	0.00	26.4	67.93	94.3	158
RO138895	0.50	0.00	28.5	72.38	100.9	172
RO138895	0.75	0.00	28.5	75.38	103.9	185
RO138895	1.00	0.00	25.1	84.78	109.9	194
RO138895	1.50	0.00	26.1	81.20	107.3	189
RO138895	0.25	0.25	28.9	71.90	100.8	157
RO138895	0.50	0.50	26.1	70.28	96.4	163
RO138895	0.75	0.75	26.3	72.08	98.4	165
BAS 90520H	0.00	0.00	23.4	71.93	95.3	177
BAS 90520H	0.25	0.00	28.0	70.30	98.3	168
BAS 90520H	0.50	0.00	25.2	74.35	99.6	178
BAS 90520H	0.75	0.00	26.2	63.93	90.2	153
BAS 90520H	1.00	0.00	24.4	69.38	93.8	153
BAS 90520H	1.50	0.00	26.3	70.93	97.3	173
BAS 90520H	0.25	0.25	26.8	70.80	97.6	169
BAS 90520H	0.50	0.50	23.7	72.00	95.7	168
BAS 90520H	0.75	0.75	26.0	72.78	98.7	173
5% LSD			NS	18.00	18.9	39.6

1/ lbs/A

2/ lb/60 row feet

Selective control of Canada thistle in potato. Callihan, R. H. and P. W. Leino. Control of emerged Canada thistle with postemergence metribuzin applications in surface-irrigated potatoes in the Upper Snake River Valley was investigated to determine whether currently registered uses of this herbicide would provide acceptable control in a surface-irrigated crop.

Metribuzin treatments were applied July 16 at the rate of 0.5 lb/A to plots in commercial furrow irrigated Russet Burbank potatoes in the flowering stage that were infested with Canada thistle plants. The thistle plants ranged from 2 to 12 inches in height, with the taller plants in the prebloom stage. A second application of 0.5 lb/A metribuzin was applied ten days later on July 26.

Metribuzin was applied in 35 gal/A water by a 12 foot (4 row) boom with eight 8005 nozzles with 25 psi at the nozzles. Plots were 50 feet long, and were replicated seven times. At the time of the first application, the air temperature was 79 F, the soil surface was 106 F and moist, and the six-inch temperature was 67 F. At the second application, the air temperature was 74 F, the soil surface was 76 F and dry and the six-inch temperature was 72 F.

Thistle control was evaluated by recording the estimated percentage of dead shoots and necrotic tissue on August 1 and September 3. Potato plants were examined for metribuzin symptoms.

Results indicate that thistle infestations treated with a single application on either July 16 or July 26 were reduced, but not as much as when two applications were used. A single application on the first date resulted in more control August 1 than did a single dose at the second application date, but by September 3 there was no significant difference between the two dates. The sequential treatment resulted in excellent control that persisted to the end of the season and that was nearly three times as effective as a single application. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Canada thistle control

Metribuzin treatment (lb/A)		Thistle necrosis (%)	
July 16 '80	July 26 '80	Aug 1 '80	Sep 3 '80
0.0	0.0	0	0
0.5	0.0	73	32
0.5	0.5	89	96
0.0	0.5	41	36
LSD 5%		9	10

Time of metribuzin application in sprinkler water during potato irrigation. Callihan, R. H. and P. W. Leino. A comparison of the relative effectiveness of metribuzin applications during the first, middle and last of a seven-hour sprinkler irrigation set was conducted in a commercially grown potato field. Single-drop Russet Burbank potatoes were planted May 29 in a moist Declo loam soil with 1.27% OM and 17% clay. The field had been irrigated twice prior to beginning the experiment treatments. Metribuzin at 0.5 lb ai/A was injected into the mainline of the solid-set irrigation system in which nozzles of agricultural impact sprinklers were systematically plugged or opened as needed in such a manner as to create herbicide plots 40 feet by 40 feet while treating and irrigating the entire field. Sprinklers were Rain-Bird model 30 WS with 1/8 inch nozzles operating at 60 psi. Three treatments were applied in this experiment, i.e. the metribuzin was injected for 20-minute periods (1) during the first half hour the the 7-hour irrigation, (2) during the middle of the 7-hour irrigation, or (3) during the last fifty minutes of the 7-hour irrigation. Control subplots were protected by plastic tarps during the 20-minute treatments. The potatoes were otherwise handled as any commerical crop. Subsequent to the treatments, the field was irrigated as needed to maintain 65% available soil moisture; i.e.there were five additional irrigations.

Weed control data were estimated on four dates subsequent to treatment by comparing treated plots with control subplots in each treated plot, and were expressed as percentage weed control. Tubers were harvested at the end of the season, weighed and graded.

Weed control data for redroot pigweed, wild buckwheat and green foxtail demonstrated that application of metriubzin during the first part of the irrigation was markedly more effective than when applied during the middle or end of the irrigation period.

Data show that weed control by treatments applied during the last hour of the irrigation period was markedly poorer at every evaluation date, regardless of weed species used as the criterion. This herbigation procedure resulted in commercially acceptable control of all weed species evaluated only when the herbicide was applied during the beginning of the irrigation period. There were no differences in yield or grade of tubers harvested.

Effect of metribuzin application timing during sprinkler irrigation upon weed control in potatoes (1980)

Time of app.	Weed control (%)[1/]												Total Yield (lb)[2/]
	July 29			Aug 5			Sept 16			Sept 27			
	Amre	Poco	Sevi	Amre	Poco	Sevi	Amre	Poco	Sevi	Amre	Poco	Sevi	
First	41	88	80	58	97	68	86	-	92	91	-	88	119
Middle	84	76	68	44	76	33	80	-	82	79	-	73	118
Last	20	17	19	11	28	10	79	-	28	53	-	27	115
LSD 5%	7.1	12.9	11.6	10.1	18	11.2	9.4	-	12.9	14.5	-	15.5	NS
CV (%)	8.5	17	16	21	21	24	10	-	15	15	-	19	4.3

1/ Amre=*Amaranthus retroflexus*; Poco=*Polygonium canvolvulus*; Sevi=*Setaria viridis*)

2/ Plot size: 36 inches by 30 feet

Effect of some amide herbicides for potato weed control. Callihan, R. H. and P. W. Leino. The acid amide herbicides RE28269, SN80786, metolachlor, and alachlor were evaluated for efficacy on annual weeds in potatoes. Metribuzin, which is not an acid amide, was included as a commercial check. Two RE28269-metribuzin sequential treatments were included.

Herbicides were applied in four replicates on June 11, 1980 to pre-emerged potatoes growing in a dry-surfaced Bannock loam. The soil surface temperature was 88 F and the air temperature was 70 F. Treatments were applied with a tractor-mounted broadcast sprayer equipped with eight 8005 nozzles operating at 25 psi and 3 mph, calibrated to deliver 35 gpa. In the sequential treatments metribuzin was applied over emerged potatoes with a bicycle sprayer utilizing the same boom and application characteristics as the tractor-mounted sprayer. In each application the herbicide was water-incorporated with a sprinkler irrigation system.

The RE28269 at rates of 1 lb/A to 2.5 lb/A showed good to excellent control of redroot pigweed (*Amaranthus retroflexus*) and excellent control of green foxtail (*Setaria viridis*). Throughout the season effective lambsquarter (*Chenopodium album*) control occurred only at the 2.5 lb/A rate with treatments of 1.5 lb/A and below providing less late season control.

The RE28269-metribuzin sequential treatment resulted in excellent control (98 to 100%) of the broadleaf species. The yield from plots treated with the RE28269-metribuzin combination (.5 lb + .25 lb) was equal to that from plots treated with the high rate of RE28269 (2.5 lb) and was better than the yield from the high rate RE28269-metribuzin (1.0 lb/A + .25 lb/A). Both rates of metribuzin resulted in excellent control of broadleaves but provided less control on green foxtail. The yield in both rates of metribuzin were not statistically different than the low rates of the RE28269-metribuzin combination or the high RE28269 rate.

SN80786 provided excellent control of redroot pigweed and green foxtail but less effective on lambsquarter. Metolachlor and alachlor showed excellent initial control of all weeds, but later control of lambsquarter was less effective. The yield of the plots treated with SN60786, metolachlor and alachlor were not statistically different from one another.

None of the chemicals showed any obvious visual damage to potatoes. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

The influence of acetanalide herbicides on weeds and potato (1980)

Herbicide	lb/A	Weed control (%) July 19 Amar-anthus	Weed control (%) July 19 Cheno-podium	Weed control (%) July 19 Set-aria	Weed control (%) Aug 1 Amar-antus	Weed control (%) Aug 1 Cheno-podium	Potato tuber yield (lb)[1/] Weight <4 oz	Potato tuber yield (lb)[1/] Weight >4 oz	Potato tuber yield (lb)[1/] Number >4 oz	Potato tuber yield (lb)[1/] Total Yield	Potato tuber yield (lb)[1/] Avg. wt. (oz)
Check	0	0	0	0	0	0	14.0	13.1	33	34.6	5.5
RE28269	0.5	65	68	56	40	5	20.8	24.0	64	44.8	5.7
RE28269	1.0	73	60	91	71	30	18.2	30.7	78	61.4	5.9
RE28269	1.5	94	86	89	90	61	24.7	49.8	127	74.5	6.3
RE28269	2.5	90	83	98	100	100	24.1	72.7	168	96.9	7.0
RE28269 + metribuzin	.5 + .25	100	99	76	98	99	23.4	71.9	173	95.3	6.7
RE28269 + metribuzin	1.0 + .25	61	45	69	68	24	22.3	37.6	97	59.8	6.1
Metribuzin	0.25	100	100	94	99	100	27.2	61.1	152	88.2	6.4
Metribuzin	0.5	100	100	88	100	100	26.4	56.8	145	83.2	6.5
SN80786	2.5	99	65	96	90	29	26.1	40.2	104	66.3	6.0
Metolachlor	2.5	95	89	98	81	66	23.5	41.6	102	65.1	6.4
Alachlor	2.5	88	95	93	98	67	25.4	54.0	131	79.3	6.5
LSD 5%		31.1	37.2	31.9	25.0	39.0	8.6	20.4	49.3	20.2	.93

[1/] Plot size: 36 inches by 30 feet.

The use of Amway adjuvant with dinoseb for potato vine dessication. Callihan, R. H. and P. W. Leino. The efficacy of Amway adjuvant with dinoseb for potato vine dessication was compared to that of a standard diesel fuel-dinoseb combination normally used in vine kill operations. Treatments were applied September 9, 1980 to plots in a field of Russet Burbank potatoes which were beginning to senesce. The air temperature was 72 F and the temperature at the wet soil-surface was 67 F. All treatments were applied with a tractor-mounted broadcast sprayer equipped with eight 8005 nozzles operating at 25 psi at 3 mph, calibrated to deliver 35 gpa by compressed air.

A randomized complete block design was used with 12 feet by 40 feet plots and four replications. Dessication was rated one day and five days after treatment, at which time frost terminated further development.

Five days after treatment, the adjuvant with 2.5 lb/A of dinoseb achieved 93 to 95% leaf kill, whereas the standard diesel-dinoseb treatment achieved a 99% kill. Addition of diesel to dinitro resulted in significantly greater dessication of leaves and stems. Addition of Amway adjuvant did not result in significantly more necrosis of leaves or stems, although there was a trend for plots treated with dinitro plus two pints/A of the adjuvant to show greater mean dessication values than these plots treated with dinitro alone. The 2.5 lb/A rate of dinoseb with diesel provided the best stem kill (63%) followed by 1.25 lb/A dinoseb plus diesel (43%). Results of treatment with 2.5 dinoseb with or without Amway adjuvant were not significantly different than dinoseb-diesel at the 1.25 rate. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Dessication of potato vines and leaves

Dinoseb (lb/A)	Amway adjuvant (pint/A)	Diesel (gal/A)	Dessication (% necrosis) 1 day Leaf	1 day Stem	5 days Leaf	5 days Stem
1.25	0	0	23	9	66	15
1.25	1	0	31	6	53	11
1.25	2	0	28	6	76	16
2.50	0	0	53	11	83	21
2.50	1	0	51	10	93	34
2.50	2	0	59	15	95	26
1.25	0	5	76	18	99	43
2.50	0	5	97	24	99	63
LSD 5%			17.4	5.8	17.4	15.1

Influence of an adjuvant, metribuzin and adjuvant-metribuzin combinations on potatoes. Callihan, R. H., and P. W. Leino. A second-year evaluation of the effect of an Amway adjuvant alone and in combination with metribuzin was conducted on commercially grown, sprinkle-irrigated Russet Burbank potatoes.

Treatments were applied in four replicates on July 22, 1980 to 12 inch potatoes on a dry-surfaced Declo loam soil. Applications were made with a tractor-mounted broadcast sprayer equipped with eight 8005 mozzles operating at 25 psi and 3 mph, calibrated to deliver 35 gpa by compressed air. The temperature at the soil surface was 124 F and the air temperature was 92 F.

Visual evaluations of foliage were made subsequent to application and the crop was harvested and graded at the end of the season. Treatment effects upon crop foliage and upon yield or grade response were not observed. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Potato response to Amway adjuvant and metribuzin

Metribuzin lb/A	Amway adjuvant pints/A	Weight(lb/plot) <4 oz	>4 oz	Total	Number >4 oz	Mean size (oz)
.00	0	25.2	90.2	115.3	209	6.9
.00	1	21.0	92.0	113.0	201	7.4
.00	2	21.8	91.1	112.9	192	7.6
.00	4	20.7	89.1	109.8	201	7.1
.25	0	22.7	83.0	105.7	190	7.0
.25	1	26.6	83.8	110.4	192	7.0
.25	2	22.9	96.5	119.4	217	7.2
.25	4	21.5	83.5	105.0	181	7.4
.50	0	23.3	82.8	106.1	191	7.1
.50	1	23.8	90.8	114.6	205	7.1
.50	2	25.0	92.3	117.3	216	6.9
.50	4	23.8	86.0	109.8	193	7.1
LSD 5%		5.1	NS	NS	NS	NS

Evaluation of wild oat herbicides for potatoes. Callihan, R. H. and P. W. Leino. SD45328, diclofop methyl, and metribuzin were evaluated for control of wild oats (Avena fatua) in potatoes. Herbicides were applied July 11, 1980 to plots in a sprinkle-irrigated commercial potato field located on a Pancheri silt loam soil. Treatments were applied with a bicycle sprayer equipped with eight 8005 nozzles operating at 25 psi at 3 mph calibrated to deliver 35 gpa by compressed air. The air temperature was 78 F. Wild oats were in a 4 to 12 leaf stage and the potatoes were 12 inches high and beginning to flower. Plots were arranged in a randomized complete block design, 12 feet by 40 feet, with four replications. Wild oat damage was evaluated in mid-July, early August, and late August.

The three chemicals produced greatly differing symptoms and damage to wild oats. SD45328 seemed to stop the growth of wild oats suddenly, the diclofop methyl reduced the wild oat stand number while metribuzin 'burned' the blades of the grass down. Metribuzin achieved 96% control by the season's end. The diclofop methyl did not provide adequate control (45 to 48%) although wild oat plants may have been too large (4 to 12 leaves) for maximum effectivenss of this herbicide. The SD45328-treated oats seemed to recover slightly and go into flower, but upon inspection, these flowers were sterile. None of the compounds caused visible damage to the potatoes in these plots. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Response of wild oats to herbicides in potatoes (1980)

Herbicide	lb/A	Wild oat control (%)			Wild oat plants/m^2
		July 19	Aug 5	Aug 22	(Aug 5)
Check	-	0	0	0	17
SD45328	.15	54	90	58	14
SD45328	.20	45	97	80	7
Diclofop methyl	1.00	43	33	45	11
Diclofop methyl	1.25	43	43	48	11
Metribuzin	.50	38	81	96	10
LSD 5%		8.9	18.5	14.8	7.0

Weed control studies in sweet potatoes. Lange, A. H. A randomized block trial for preemergence weed control applied over newly planted (May 24, 1980) Jewel sweet potato cuttings two rows to a five foot bed. Seven herbicides were applied May 27, 1980 to moist soil (Delhi loamy sand) and sprinkled in the same day with one-half inch of water. The plots were given about 4/10 inch water the next day also. In between each row of plots a row of black plastic was planted for comparison. Each bed had 2 lb. per 100 sq. ft. methyl bromide applied preplant.

The vigor and weed control ratings were made from the unmulched, chemically treated plots but the plastic beds were considered 10 (most vigorous) through the growing season.

The only herbicides showing significant foliar symptoms and stunting was norflurazon. The weed control was good for most treatments with exception of grass control with chloramben and chlorpropham. Bursage was not controlled well by diphenamid or the low rate of chlorpropham.

The weed pressure was not heavy but the yield was considerably lower for the untreated checks particularly in those replications that were more weedy than the less weedy ones. Yields from the two rates of diphenamid and napropamide, were averaged in order to have sufficient replication. The plots with black plastic were replicated six times at random along the beds.

The yield data indicated an increase in total sweet potatoes harvested for the chemical over the untreated check. The increase due to the black plastic and methyl bromide fumigation was considerably greater than the untreated check or weed control with diphenamid or napropamide. The increase in foliage vigor expressed in the early ratings was translated into increased yields of particularly marketable potatoes. (University of California, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Table 1. The effect of two herbicides vs. black polyethylene mulch on the yield of Jewel sweet potatoes (425-73-513-183-1-80)

		Average Fresh Weight[1/]			
Herbicides	lb/A	Total Weight	Percent Greater[2/]	Total Weight	Percent Greater[2/]
Diphenamid	4-8	22.8	14.6	11.2	
Napropamide	2-4	23.4	17.6	12.5	3.3
Black Plastic[3/]	-	27.7	39.2	19.3	59.5
Check	-	19.9		12.1	

1/ Total market weight average of 4 replications. Evaluated 11/17/80.
2/ Percent increase in weight in relation to untreated check.
3/ Average of 6 replications instead of 4.

Table 2. A comparison of preemergence herbicides on the vigor on and weed control in sweet potatoes growing in a Delhi sandy loam soil (425-73-513-183-1-80)

		Average[1/] Sweet Potato Vigor		Average[2/] Weed Control	
Herbicides	lb/A	7/16/80	10/7/80	7/16/80	10/7/80
Diphenamid	4	7.0	8.8	9.5	9.0
Diphenamid	8	7.0	6.8	8.5	7.5
Chloramben	4	10.0	9.0	6.5	8.5
Chloramben	8	8.0	6.8	4.0	5.5
Norflurazon	2	7.0	6.0	10.0	9.0
Norflurazon	4	6.2	7.0	10.0	9.5
Napropamide	2	8.0	8.8	9.5	8.5
Napropamide	4	9.0	9.0	9.0	9.0
Ethalfluralin	2	8.8	8.8	8.5	8.5
Ethalfluralin	4	8.2	8.0	10.0	9.0
Chlorpropham	2	7.8	7.0	7.0	6.5
Chlorpropham	4	9.0	7.8	9.0	7.5
Chloroxuron	2	10.0	9.0	8.5	8.0
Chloroxuron	4	7.8	7.0	10.0	10.0
Check	-	8.0	7.0	3.5	3.5
Check	-	8.2	7.8	1.5	7.5

1/ Average of 3 replications where 0 = no vigor, plant dead and 10 = vigorous, healthy plant.

2/ Average of 2 replications where 0 = no weed control and 10 = best weed control. Weeds include tumbling pigweed, carpet weed, filaree, lambsquarter, puncturevine, contorted primrose, sowthistle, crabgrass. Treated 5/27/80.

Herbicide evaluation trials on dry beans. Brenchley, R. G. and D. L. Zamora. Field trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho to evaluate potential herbicides for weed control in dry beans. Herbicide applications were made May 5, 1980 (preplant incorporated) and May 7, 1980 (preemergence). Environmental conditions at the time of application were as follows: (May 5, 1980, air temperature 72 F, soil temperature 71 F, relative humidity 15%, wind SE 3 mph, cloud cover 10%, soil surface dry to 4 inches), (May 7, 1980, air temperature 65 F, soil temperature 68 F, relative humidity 20%, wind SE 3 mph, cloud cover 80%, soil surface dry to 4 inches). Soil type was a silt loam, 1.2% organic matter, pH 7.2, CEC 15 meq. Plot size was 8 by 35 ft. Treatments were replicated three times in a randomized complete block design. Herbicides were applied using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 28 psi pressure with a delivery rate of 27 gpa total volume. Preplant incorporated treatments were incorporated using a Lely Roterra set at a five inch depth. Pinto beans (variety: U of I #114) were seeded at a rate of 75 lb/A at a two inch depth on 24 inch row spacings on May 6, 1980. Bean yields were taken by harvesting the center two rows out of a four row plot on September 8, 1980.

Rainfall amounts consisted of .14 inches on May 9 to 11, .73 on May 15 to 16, 1.15 inches on May 23 to 29, .28 on June 2, .22 on June 4, .20 on June 12 to 13, .09 on June 24, .11 on July 3 to 4, .10 on August 18. Plots were furrow irrigated on May 7, June 16, July 4, July 15, July 25, August 6, and August 20, 1980.

The weed species present and their density per square ft. in the weedy checks, measured six inches on either side of the bean row were hairy nightshade 63, redroot pigweed 28, barnyardgrass 16, and common lambsquarters 1.25. Weed control evaluations were taken on June 3, 1980 and June 24, 1980.

Herbicide combinations were generally far superior to individual herbicides for broad-spectrum,full-season weed control. Those combinations in which one of the components was ethalfluralin (EPTC + ethalfluralin, alachlor + ethalfluralin, metolachlor + ethalfluralin and cycloate + ethalfluralin) were the superior treatments; however, those combinations in which trifluralin was a component also gave respectable weed control. EPTC + alachlor was the superior treatment during the June 3, 1980 evaluation; however, this treatment tended to fall off rapidly in broadleaf control between June 3 and June 24 (note the hairy nightshade and redroot pigweed control). Yields from the EPTC + alachlor treatments were among the very highest in the experiment despite this lack of late season control which would indicate that weeds emerging later in the season are not near as competitive in beans as weeds which emerge with the crop. Results from this experiment definitely indicate the need and advantages of herbicide combinations for broad-spectrum, full-season weed control. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Table 1. Influence of soil applied herbicides for weed control in pinto beans, 1980

Treatments	Rate[1/] lb/A	Crop Injury[2/] %Std	%St	%Def	Percent Weed Control[3/] HNS Jun3	HNS Jun24	RPW Jun3	RPW Jun24	BYG Jun3	BYG Jun24	CLQ Jun24	Yield lb/A
Preemergence												
RE-28268	2.5	100	0	0	81	73	98	96	99	97	42	1601
PPG-844	0.5	100	0	0	98	92	99	98	25	11	75	1129
PPG-844	1.0	100	0	0	99	97	100	98	22	7	98	1271
Preplant Incorporated												
RE-28268	1.5	86	0	0	83	76	95	91	100	94	56	1525
RE-28268	3.0	95	0	0	96	84	99	94	99	96	65	1647
RE-28268 + Trifluralin	2.0+0.5	100	0	0	90	87	100	97	96	95	89	2234
PPG-844	0.5	100	0	0	74	59	98	95	0	0	83	1069
PPG-225	0.5	62	24	28	96	81	98	97	63	51	93	842
Ro-13-8895	0.75	76	10	0	0	0	0	0	93	91	0	637
NC-20484	2.0	100	0	0	85	71	98	90	98	89	87	1650
NC-20484 + Alachlor	1.5+2.0	76	15	16	97	74	100	93	100	94	97	1544
SN-80786	1.5	100	0	0	80	72	91	86	98	90	75	1234
SN-80786	3.0	81	5	0	95	89	97	89	95	92	80	1247
Alachlor	2.0	100	0	0	92	75	98	85	99	81	70	1874
Alachlor	3.0	100	0	0	96	76	100	92	100	85	81	1914
Metolachlor	2.5	100	0	0	95	86	100	89	100	97	82	1713
EPTC	3.0	100	0	0	82	62	94	92	100	93	91	997
EPTC	4.0	100	0	0	75	60	86	90	100	97	94	911
Trifluralin	0.75	100	0	0	44	41	89	94	97	99	98	1086
Handweeded Check		100	0	0	100	100	100	100	100	100	100	2676
Weedy Check		100	5	0	0	0	0	0	0	0	0	548

1/ All rates are expressed as ai/A.
2/ Crop injury Std=Stand, St=Stunt, Def=Deformed or abnormal plants
3/ HNS=hairy nightshade, RPW=redroot pigweed, BYG=barnyardgrass, CLQ=common lambsquarters

Table 2. Influence of soil applied herbicides for weed control in pinto beans, 1980

Treatments	Rate[1/] lb/A	Crop Injury[2/] %Std	%St	%Def	Percent Weed Control[3/] HNS Jun3	HNS Jun24	RPW Jun3	RPW Jun24	BYG Jun3	BYG Jun24	CLQ Jun24	Yield lb/A
Preplant Incorporated												
Cycloate	3.0	67	15	0	71	63	80	69	81	76	82	1181
Cycloate	4.0	100	30	18	93	85	93	86	84	82	94	1782
Cycloate	6.0	71	40	28	96	87	98	89	94	89	97	1957
Cycloate + Trifluralin	2.0+0.5	86	5	0	85	72	98	96	98	96	96	2069
Cycloate + Trifluralin	3.0+0.5	86	10	0	78	67	98	98	94	97	97	1822
Cycloate + Ethalfluralin	2.0+1.0	90	0	0	97	94	99	99	98	98	99	2247
Vernolate	4.0	95	0	0	60	44	96	98	94	91	97	1112
Trifluralin	0.75	100	0	0	44	41	89	94	97	99	98	1086
Profluralin	0.75	100	0	0	31	29	91	91	96	95	97	429
Dinitramine	0.5	100	0	0	77	73	93	93	95	96	96	960
Ethalfluralin	1.0	90	0	0	88	85	96	95	100	100	99	1277
Ethalfluralin	1.5	100	0	0	83	82	96	96	100	100	99	1594
Ethalfluralin	2.0	100	0	0	90	89	96	95	99	100	99	1518
Fluchloralin	1.0	100	0	0	0	0	62	60	89	87	99	1188
Alachlor + Fluchloralin	2.0+1.0	71	0	0	91	76	99	99	97	96	97	1445
Alachlor + Trifluralin	2.5+0.5	95	0	0	98	81	100	98	100	98	96	2363
Alachlor + Ethalfluralin	2.0+1.0	90	0	0	99	91	100	99	100	100	100	2185
Metolachlor + Trifluralin	2.0+0.5	95	0	0	83	76	99	98	100	97	98	1762
Metolachlor + Profluralin	2.0+0.5	100	0	0	79	66	95	94	100	100	100	1297
Metolachlor + Ethalfluralin	2.0+1.0	85	5	10	100	92	100	100	100	100	100	2340
EPTC + Trifluralin	3.0+0.5	100	0	0	89	81	100	99	98	96	97	2072
EPTC + Trifluralin	3.0+0.75	100	0	0	97	95	100	99	99	99	98	2534
EPTC + Alachlor	2.0+2.0	100	0	0	97	82	100	87	100	96	91	2574
EPTC + Alachlor	3.0+2.0	100	0	0	100	85	100	89	100	98	93	2561
EPTC + Ethalfluralin	2.0+1.0	100	0	0	94	92	98	95	100	99	100	3016
Handweeded Check		100	0	0	100	100	100	100	100	100	100	2676
Weedy Check		100	5	0	0	0	0	0	0	0	0	548

1/ All rates are expressed as ai/A.
2/ Crop injury Std=Stand, St=Stunt, Def=Deformed or abnormal plants
3/ HNS=hairy nightshade, RPW=redroot pigweed, BYG=barnyardgrass, CLQ=common lambsquarters

Evaluation of sequential and post emergence treatments on pinto beans. Brenchley, R. G. and D. L. Zamora. Field evaluation trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho to evaluate potential herbicides for sequential (PPI + post emergence) or post emergence weed control in dry beans. Herbicide applications were made May 5, 1980 (preplant incorporated) and June 9, 1980 (post emergence). Environmental conditions at the time of application were as follows: (May 5, 1980, air temperature 73 F, soil temperature 71 F, relative humidity 15%, wind SE 3 mph, cloud cover 10%, soil surface dry to 4 inches in depth), (June 9, 1980, air temperature 76 F, soil temperature 66 F, relative humidity 23%, wind E 2 mph, cloud cover 30%, soil moist to surface). Soil type was a silt loam, 1.2% organic matter, pH 7.2, CEC 15 meq. Plot size was 8 by 35 ft. Treatments were replicated three times in a randomized complete block design. Herbicides were applied using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 28 psi pressure with a delivery rate of 27 gpa total volume. Preplant incorporated treatments were incorporated using a Lely Roterra set at a five inch depth. Pinto beans (variety U of I #114) were seeded at a rate of 75 lb/A to a two inch depth on 24 inch row spacings on May 6, 1980. Bean yields were taken by harvesting the center two rows out of a four row plot on September 8, 1980.

Rainfall amounts were as follows: .14 inches on May 9, .73 inches on May 15 to 16, 1.15 inches on May 23 to 29, .28 inches on June 2, .22 inches on June 4, .20 inches on June 12 to 13, .09 inches June 24, .11 inches on July 3 to 4, .10 inches on August 18. Plots received furrow irrigation on May 7, June 16, July 4, July 15, July 25, August 6 and August 20, 1980.

Weed species present and their density per square ft (average of six sq. ft. per plot) in the weedy checks (measured six inches either side of the bean row) were hairy nightshade 63, redroot pigweed 28, barnyardgrass 16, and common lambsquarters 1.25. Weed control evaluations were taken June 3, 1980 and June 24, 1980.

Outstanding treatments for broad-spectrum weed control were alachlor + bentazon and trifluralin + bentazon. Bentazon increased late season annual broadleaf control when applied sequentially over preplant incorporated treatments of either alachlor or trifluralin. Sequential treatments of diclofop applied post emergence increased the late season annual grass control of alachlor but not trifluralin. RO-13-8895, BAS-9052 OH and diclofop all showed potential for post emergence annual grass control in dry beans. PPG-844 and PPG-225 show excellent post emergence activity on annual broadleaf weeds but were much too injurious to the dry beans. Injury appears as severe leaf burn especially around the leaf margins. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Comparison of sequential and post emergence treatments on pinto beans 1980

Treatments[1/]	Rate[2/]	Crop Injury[3/]			Percent Weed Control[4/]							Yield
					HNS		RPW		BYG		CLQ	
	lb/A	%Std	%St	%Def	Jun3	Jun24	Jun3	Jun24	Jun3	Jun24	Jun24	lb/A
Sequential (Preplant Incorporated + Post Emergence)												
Alachlor PPI	3.0	100	0	0	96	76	100	92	100	85	81	1914
Alachlor + Diclofop	3.0+1.0	100	0	0	97	84	99	87	100	100	82	1848
Alachlor + Diclofop	3.0+2.0	100	0	0	94	77	99	90	100	100	85	2063
Alachlor + Bentazon	3.0+1.0	95	0	0	96	100	99	98	100	88	95	2620
Trifluralin PPI	0.75	100	0	0	44	41	89	94	97	99	98	1086
Trifluralin + Diclofop	0.75+1.0	100	0	0	46	42	89	91	93	93	97	815
Trifluralin + Bentazon	0.75+1.0	100	0	0	67	95	92	92	98	98	99	2538
Fluchloralin + Bentazon	0.75+1.0	67	0	0	36	80	80	82	96	92	100	2224
Post Emergence												
Ro-13-8895	0.25	95	9	0		0		0		98	0	842
Ro-13-8895	0.5	100	12	0		0		0		97	0	644
Ro-13-8895 + Bentazon	0.5+1.0	100	8	0		31		12		98	67	564
PPG-844	0.125	100	33	100		23		85		0	0	657
PPG-844	0.5	100	57	100		82		93		0	0	475
PPG-844	1.0	100	69	100		83		96		0	17	614
PPG-225	1.5	28	76	100		73		82		0	98	112
Bentazon	1.0	100	0	0		21		20		0	83	769
Bentazon + BAS-9052 OH	1.0+0.5	100	7	0		49		25		100	95	1337
Bentazon + Diclofop	1.0+0.75	100	0	0		25		19		65	80	1313
Bentazon + Diclopfop	1.0+1.0	100	0	0		20		22		85	85	1218
Handweeded Check		100	0	0	100	100	100	100	100	100	100	2676
Weedy Check		100	5	0	0	0	0	0	0	0	0	548

1/ All bentazon treatments received MOR-ACT surfactant 1 qt/A; Ro-13-8895 received Ortho X-77 0.5% v/v.
2/ All rates are expressed as ai/A.
3/ Crop injury Std=Stand, St=Stunt, Def=Deformed or abnormal plants
4/ HNS=hairy nightshade, RPW=redroot pigweed, BYG=barnyardgrass, CLQ=common lambsquarters

Evaluation of an extender to increase the residual life of EPTC on dry beans. Brenchley, R. G. and D. L. Zamora. A field study was established near Parma, Idaho to evaluate the effectiveness of R-33865 as a possible extender to lengthen the soil residual life of EPTC. All treatments were applied May 5, 1980. Environmental conditions at the time of application were as follows: air temperature 72 F, soil temperature 71 F, relative humidity 15%, wind SE 3 mph, cloud cover 10%, soil surface dry to a 4 inch depth. Soil type was a silt loam, 1.2% organic matter, pH 7.2, CEC 15 meq. Plot size was 8 by 35 ft. Treatments were replicated four times in a randomized complete block design. Herbicides were applied using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 28 psi pressure with a delivery rate of 27 gpa total volume. Treatments were incorporated using a Lely Roterra set at a depth of five inches. Pinto beans (variety, U of I #114) were seeded at a rate of 75 lb/A, 2 inches deep on 24 inch row spacings on May 6, 1980. Bean yields were taken by harvesting the center two rows out of a four row plot on September 8, 1980.

Rainfall amounts consisted of .14 inches on May 10, .73 inches on May 15 to 16, 1.15 inches on May 23 to 29, .28 inches on June 2, .22 inches on June 4, .20 inches on June 12 to 13, .09 inches on June 24, .11 inches on July 3 to 4, and .10 inches on August 18. Plots were furrow irrigated on May 7, June 16, July 4, July 15, July 25, August 6, and August 20, 1980.

Weed species present and their population per sq. ft. at time of evaluation were as follows: hairy nightshade 63, redroot pigweed 28, barnyardgrass 16. Weed control evaluations were taken June 3, 1980 and June 24, 1980.

Results of this experiment showed that R-33865 had no significant affect on extending the soil residual life of EPTC. (SW Idaho Research and Extension Center, University of Idaho 83660)

		Percent Weed Control[3/]						
	Rate[2/]	RPW		HNS		BYG		Yield
Treatment[1/]	lb/A	30 DAT	51	30 DAT	51	30 DAT	51	lb/A
EPTC	3.0	94	92	82	62	100	93	997
EPTC	4.0	86	90	75	60	100	97	911
EPTC + R-33865	3.0	67	62	78	61	97	95	878
EPTC + R-33865	4.0	90	83	86	71	99	96	1600
EPTC + Trifluralin	3.0 + 0.5	100	99	89	81	98	96	2072
EPTC + Trifluralin	3.0 + 0.75	100	99	97	95	99	99	2534
EPTC + R-33865 + Trifluralin	3.0 + 0.5	97	95	83	77	99	100	2861
EPTC + R-33865 + Trifluralin	3.0 + 0.75	99	97	85	81	98	100	2660
Handweeded Check		100	100	100	100	100	100	2676
Weedy Check		0	0	0	0	0	0	548

1/ EPTC + R-33865 = prepackaged mix with a ratio of 6:1.
2/ Rates expressed as ai/A of either EPTC or Trifluralin.
3/ RPW=redroot pigweed, HNS=hairy nightshade, BYG=barnyardgrass, DAT=days after treatment

Lettuce response to dicamba and 2,4-D. Doty, C. H. and K. C. Hamilton. The response of head lettuce to low rates of dicamba and 2,4-D (amine) applied at three stages of lettuce growth was studied in a test at Mesa, Arizona in 1979-80. Beds were prepared and planted to Empire lettuce on December 5, 1979. On the same day preemergence herbicides were applied to dry soil. The test was irrigated by watering every furrow on December 7, 1979. Applications at the five-leaf stage were made February 22, 1980. During the next few days the lettuce was thinned to an 8 to 10 inch spacing. Applications at head initiation were made on April 13, 1980 when the lettuce was approximately 10 inches in diameter. The test was cultivated and hand weeded as necessary to control weeds. Herbicides were applied in 40 GPA water. Plots were two 40-inch wide beds, 30 feet long, and treatments were replicated four times.

Dicamba applied preemergence at 0.25 lb/A caused stunting of seedlings, downward curling of cotyledons, leaf distortion, and stand reduction. At 0.025 lb/A symptoms were slight and lettuce growth was normal 8 weeks following treatment. At 0.0025 lb/A no abnormal lettuce growth was observed.

Dicamba applied to lettuce with five leaves at 0.25 lb/A caused severe epinasty. Leaves developed a dull green color, cupped upwards, and the edges curled downwards. Stem tissue at the base of leaves became swollen and eventually 90% of the plants died. At 0.025 lb/A the same type of symptoms developed, but much less severely than at the higher rate. Eight weeks following treatment lettuce was growing normally, however, the plants were smaller and head initiation was delayed. Dicamba at 0.0025 lb/A produced slight leaf epinasty, but growth was normal 8 weeks following treatment.

Applications of 0.25 lb/A dicamba to lettuce initiating heads caused severe downward curling of leaf edges, development of a dull pale-green color, and complete inhibition of head formation. At 0.025 lb/A slight leaf curling and discoloration occurred, and the lettuce formed heads which were less compact than untreated heads. At 0.0025 lb/A no symptoms of dicamba were observed.

Preemergence application of 2,4-D at 0.25 lb/A caused stunting, leaf distortion, and development of 'strap' leaves. Eight weeks following treatment plants were smaller than untreated plants and head initiation was delayed. At 0.0025 lb/A no symptoms were observed.

Application of 0.25 lb/A 2,4-D to lettuce with five leaves caused severe epinasty, leaf curling, and swelling of stem tissue at the base of leaves. Ninety-five percent of the plants had died 8 weeks following treatment. At 0.0025 lb/A there was slight epinasty and stunting, but 8 weeks following treatment plants were producing normal growth.

Application of 0.25 lb/A 2,4-D to lettuce initiating heads caused chlorosis of older leaves, 'feather-edging' of new leaves, and development of a shiny green color. Leaves unfolded causing complete inhibition of normal head development. At 0.0025 lb/A no symptoms of 2,4-D were observed.

The inhibition of normal head lettuce development by dicamba and 2,4-D was greatest when applied at either the five leaf or head initiation stage. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721.)

Lettuce stand and head formation after applying low rates of dicamba and 2,4-D at three growth stages

Treatment			Lettuce response	
Herbicide	lb/A	Lettuce size when applied	Stand % estimated	Formed Heads [1/] % of untreated
Dicamba	0.25	Preemergence	66	49
Dicamba	0.025	Preemergence	100	97
Dicamba	0.0025	Preemergence	99	100
Dicamba	0.25	Five leaf	11	1
Dicamba	0.025	Five leaf	96	92
Dicamba	0.0025	Five leaf	99	95
Dicamba	0.25	Head initiation	96	0
Dicamba	0.025	Head initiation	98	95
Dicamba	0.0025	Head initiation	99	97
2,4-D [2/]	0.25	Preemergence	93	83
2,4-D	0.0025	Preemergence	100	98
2,4-D	0.25	Five leaf	3	0
2,4-D	0.0025	Five leaf	98	86
2,4-D	0.25	Head initiation	78	0
2,4-D	0.0025	Head initiation	100	97
Untreated			100	

1/ a formed head was one which was at least 2.5 inches in diameter and firm when squeezed. Percentages calculated from 40 feet of lettuce row.

2/ amine formulation

Evaluations of pre-emergence herbicide combinations for annual weed control in carrots. Peabody, D.V. Seed bed preparation and planting were completed April 29, 1980; carrots being planted 0.25 inches deep in rows 4 ft. apart. The variety was Red-cored Chantenay. Soil type was silt loam with a pH of 5.5 and organic matter content of 3.2%. Herbicides were applied on May 1, 1980 in a band over the row. Plot size was one row, 5 ft. long; all treatments replicated 4 times. Total rainfall within the two week period after planting was 0.03 inches and within four weeks after planting was 1.90 inches.

One of the objectives of this field trial was to determine the weed control efficacy of various herbicide combinations at low rates of application. Low rate combinations might reduce phytotoxicity to the carrots but still result in adequate control of annual weeds. The three dominant weed species as well as the total annual weed population were rated twice, July 2, 1980 and August 20, 1980 (only ratings of the latter date reported in the Table). On October 7, 1980, carrots were dug, washed, and fresh weights from each plot recorded. Treatments which resulted in carrot yields less than the hand-weeded checks but gave excellent weed control were the metribuzin-oxyfluorfen combinations. The low yields associated with the metribuzin combinations with trifluralin, ethalfluralin and oryzalin, and the oryzalin combinations with napropamide and trifluralin are probably due more to the very poor weed control rather than to the effect of the herbicides on carrot growth. Those combinations which did result in good weed control and did not cause a reduction in carrot yield much below that of the hand-weeded check were metribuzin with the higher rate of oxadiazon and the oryzalin-oxyfluorfen combination. One of the principal factors which affected the results of this test was the very low rainfall that occurred after treatment application. (Washington State Univ., Northwestern Washington Research and Extension Unit, Mount Vernon, WA 98273).

Carrot yield and weed control activity of 16 preemergent herbicides and herbicide combinations

Herbicide	Rate	Weed control 1/				Carrot yield 2/
	lb/A	PESW	COLQ	WIBU 3/	GWR	gm/plot
Weedy check	-	1.8	1.3	4.0	1.3	6528
Hand-weeded check	-	5.0	5.0	5.0	5.0	12440
Linuron	1.0	5.0	5.0	5.0	5.0	10480
Metribuzin	0.25	3.3	3.0	3.5	2.5	7968
Metribuzin	0.5	4.8	5.0	4.3	4.5	10448
Metribuzin + Trifluralin	0.25 0.5	3.0	3.8	4.0	3.3	9663
Metribuzin + Ethalfluralin	0.25 0.5	2.5	4.3	5.0	2.8	7710
Metribuzin + Oryzalin	0.25 0.25	2.0	3.0	4.0	2.3	7695
Metribuzin + Oxyfluorfen	0.25 0.5	5.0	5.0	5.0	5.0	9458
Metribuzin + Oxyfluorfen	0.25 1.0	5.0	5.0	5.0	5.0	8968
Metribuzin + Oxadiazon	0.25 1.0	5.0	5.0	5.0	5.0	9663
Metribuzin + Oxadiazon	0.25 2.0	5.0	5.0	5.0	5.0	10110
Metribuzin + Napropamide	0.25 1.0	3.3	4.5	5.0	3.5	9578
Metribuzin + Napropamide	0.25 2.0	4.5	3.8	4.5	3.8	10608
Oryzalin + Napropamide	0.25 1.0	1.5	4.0	5.0	1.8	9223
Oryzalin + Oxyfluorfen	0.25 0.5	5.0	5.0	5.0	5.0	11088
Oryzalin + Trifluralin	0.25 0.5	1.3	3.3	5.0	1.8	5833
Oryzalin + Oxadiazon	0.25 1.0	4.5	5.0	5.0	4.5	9968

1/ Average of 4 replications where 1 equals no control and 5 equals elimination of all weeds.
2/ Average of 4 replications, fresh weight of washed carrots.
3/ Abbreviations: PESW = Pennsylvania smartweed; COLQ = common lambsquarters; WIBW = wild buckwheat; GWR = general rating of all species present.

Using preemergence herbicide combinations on deciduous nursery stock grown from softwood cuttings. 1/Richards, W. D., 2/W. Ward. On May 12, 1980, a trial was established at Pacific Coast Nursery Inc., Sauvie Island, on 5 deciduous tree varieties to determine the effectiveness of 2 granular preemergence herbicides. These materials were mixed for test purposes and used in combination on ornamental shade trees that were grown in the greenhouse from cuttings and transplanted in the test area on April 16, 1980. These plants were london planetree, 'October Glory' red maple, 'Red Sunset' red maple, 'Schlesinger' red maple, and 'Thundercloud' plum. The trees were planted in commercial rows 4 feet apart on a 1 foot spacing and the treatments were applied in an 18 inch by 12 foot plot and were replicated 2 times for each variety.

The herbicides applied to each variety were napropamide 10G at 4 lb ai/A plus oxadiazon 2G at 4 lb ai/A. The treatments were applied on May 12, 1980.

Initial observations on weed control and crop tolerance were taken on June 12, 1980 with 2 subsequent checks made on July 8, 1980 and August 6, 1980. The plots were given a visual rating from Ø to 10 for weed control and crop tolerance. The weeds observed were annual bluegrass, barnyard grass, mustard, yellow nutsedge, and water smartweed.

The napropamide 10G plus oxadiazon 2G combination proved to give fair to good weed control on everything except yellow nutsedge. Neither material is registered for use on yellow nutsedge. The napropamide seemed to be weak on complete coverage due to the high percentage of ai in the granular form. It is our opinion that the 10G formulation should be modified to a 2G or 4G formulation to overcome this problem. The crop tolerance to both materials was fair to good with no economic loss. 1/(Research Supervisor, Pacific Coast Nursery Inc., Route 1, Box 320, Portland, Oregon 97231 and 2/Consulting Entomologist, Pacific Coast Nursery Inc., Route 1, Box 320, Portland, Oregon 97231).

Using preemergence herbicide combinations on deciduous nursery stock grown from softwood cuttings

Treatment	Rate	planetree	'October Glory'	'Red Sunset'	'Schlesinger'	plum
napropamide 10G plus oxadiazon 2G	4 lb ai/A plus 4 lb ai/A					
weed control (broadleaf and grasses)		9.0	9.0	9.0	9.0	9.0
crop tolerance		1.2	2.2	2.0	2.1	1.0
check						
weed control (broadleaf and grasses)		3.0	3.1	2.0	2.5	2.2
crop tolerance		1.0	1.3	1.1	2.1	1.0

Control and crop tolerances are an average taken from 3 rating dates with 10 = total control or total crop kill.

Effect of herbicide formulation on annual weed control in cherries. Anderson, J. L. and M. G. Weeks. To compare the liquid and wettable powder formulations of simazine and napropamide for weed control in fruit trees, plots each containing one 12-year-old sweet cherry, one 10-year old tart cherry, and one 4-year-old tart cherry tree were established in December, 1979 at the Farmington Field Station and evaluated six months later. Herbicides were applied with a carbon dioxide hand sprayer in 50 gal. water/A. No difference in control of annual weeds could be observed between liquid and wettable powder formulation treatments of simazine. In this study, however, the napropamide wettable powder treatments generally gave better control on annual weeds than did the liquid formulation treatments (see following table). The plots contained considerable field bindweed. No treatment appeared to reduce bindweed development.

The field in which the trees were planted had been leveled several years previously exposing the subsoil for about 40 feet alone one end of the field. Tree growth in this area is somewhat restricted and requires a complete fertilizer rather than only nitrogen which the remainder of the orchard receives. The younger tart cherry tree in the simazine 4L and simazine 80W plots located in this area developed moderately severe leaf chlorosis and marginal necrosis as the result of treatment. Fruit maturity on these trees was delayed. Symptoms were restricted to trees in the two plots in the area with the topsoil removed. Comparable trees in other replications were not affected. This tends to support our recommendation that cherry trees growing in soil of low organic matter not be treated with soil applied herbicides. (Plant Science Department, UMC 48, Utah State University, Logan, UT 84322)

Effect of herbicides on control of annual weeds in cherries

Treatment	Formulation	Rate (lb/A)	Annual Weed Control[1]
simazine	4L	2	7.8
simazine	80W	2	7.8
napropamide	2E	4	4.5
napropamide	50W	4	7.0
napropamide + simazine	50W 80W	4 1	9.0
napropamide + simazine	2E 4L	4 1	9.0
terbacil	80W	2	5.7
napropamide + terbacil	50W 80W	4 1	6.5
napropamide + terbacil	2E 80W	4 1	7.5
diuron	80W	2	8.5
napropamide + diuron	50W 80W	4 1	9.0

[1]control of annual weeds rated 1 to 10 June 17, 1980. 10 = complete control of annual weeds. Weeds present were primarily Russian thistle and bristly foxtail.

Control of herbaceous plants in sweet cherries. Brenchley, R. G. Total vegetative control of herbaceous weeds in fruit trees is a desirable practice in Idaho for the following reasons: reduction of insect and disease incidence, better fertility and water management, greater ease of harvest, and reduction of tree damage due to rodents feeding on the green bark of established trees during the winter season. Because of these benefits, herbicide evaluation trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho during the fall and winter of 1979-80 to determine which treatments were capable of providing broad-spectrum, long residual control of existing herbs. Four varieties of sweet cherries (Lambert, Royal Ann, Bing, Van) were planted March 26, 1970. Trees were planted 8.5 feet between trees on 21 foot row spacings.

Native ground cover consisted of orchardgrass, bluegrass, downy brome, narrowleaf vetch, dandelion, field bindweed, and legumes (alfalfa, white clover, red clover).

Herbicide applications were made September 26, 1979 (glyphosate, oxadiazon, paraquat), November 6, 1979 (napropamide, simazine), March 13, 1980 (dichlobenil). Environmental conditions at the time of herbicide application were as follows: (September 26, 1979, air temperature 75 F, soil temperature 68 F, relative humidity 45%, wind SW 4 mph, cloud cover 0%, soil moist to surface), (November 6, 1979, air temperature 50 F, soil temperature 44 F, relative humidity 65%, wind SW 1 mph, cloud cover 0, soil moist to surface), (March 13, 1980, air temperature 42 F, soil temperature 39 F, relative humidity 47%, wind SW 7 mph, cloud cover 100%, soil moist to surface). Soil was a silt loam, 1.4% organic matter, pH 7.1, with a CEC of 17 meq. Plot size was 6 by 25.5 feet (3 trees). Herbicide treatments were replicated four times per sweet cherry variety except for the Royal Ann variety which was replicated 3 times. Plot design was a randomized complete block. Herbicide applications were made using a CO_2 propelled knapsack sprayer equipped with two nozzles (150 degree tips delivering 30 gpa at 30 psi September 26, 1979, 8004 nozzles delivering 44 gpa at 30 psi November 6, 1979). Dichlobenil 4G was applied using a quart jar with perforated lid, 3 passes per plot. Plots were evaluated May 13, 1980.

Rainfall amounts consisted of 1.43 inches in October 1979, .83 inches in November, 1.57 inches in December 1979, 1.78 inches in January 1980, 1.58 inches in February 1980, 1.51 inches in March 1980, .55 inches in April 1980, 2.04 inches in May 1980.

Outstanding treatments were glyphosate + dichlobenil, paraquat + dichlobenil, glyphosate + simazine, glyphosate + napropamide + simazine. Dichlobenil gave superior control of field bindweed and dandelion (see accompanying tables). Dichlobenil 6.0 lb ai/acre caused slight injury (minor chlorosis around the leaf margins on several trees). All four sweet cherry varieties appeared to be equally susceptible to dichlobenil injury. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Table 1. Weed control in sweet cherries

Treatment[1/]	Rate[2/] lb/A	Percent Weed Control[3/] OG	BG	DB	NLV	LG	DL	FBW
Lambert Variety								
Paraquat	1.0	36	38	93	90	75	12	0
Paraquat + Dichlobenil	1.0 + 6.0	94	100	100	100	100	97	93
Paraquat + Oxadiazon	0.5 + 4.0	65	78	93	84	43	0	0
Glyphosate	2.25	93	100	93	97	100	88	90
Glyphosate + Dichlobenil	2.25 + 6.0	100	100	100	99	100	100	98
Glyphosate + Simazine	2.25 + 2.4	100	100	100	100	100	90	82
Glyphosate + Napropamide + Simazine	2.25 + 4.0 + 0.8	100	100	100	95	100	92	82
Weedy Check		0	0	0	0	0	0	0
Bing Variety								
Paraquat	1.0	41	35	87	80	78	0	0
Paraquat + Dichlobenil	1.0 + 6.0	90	97	100	100	100	96	89
Paraquat + Oxadiazon	0.5 + 4.0	60	72	94	93	37	0	0
Glyphosate	2.25	100	100	87	94	95	89	83
Glyphosate + Dichlobenil	2.25 + 6.0	100	100	100	100	100	100	96
Glyphosate + Simazine	2.25 + 2.4	100	100	100	100	100	85	87
Glyphosate + Napropamide + Simazine	2.25 + 4.0 + 0.8	100	100	100	97	100	87	81
Weedy Check		0	0	0	0	0	0	0

1/ All treatments containing Paraquat received Ortho X-77 at 8 oz./100 gal. solution
2/ Rate expressed in lb ai/A.
3/ OG=orchardgrass, BG=bluegrass, DB=downy brome, NLV=narrowleaf vetch, LG=legumes (alfalfa, red clover, white clover), DL=dandelion, FBW=field bindweed

Table 2. Weed control in sweet cherries

Treatment[1]	Rate[2] lb/A	Percent Weed Control[3]						
		OG	BG	DB	NLV	LG	DL	FBW
Royal Ann Variety								
Paraquat	1.0	33	47	94	93	72	0	0
Paraquat + Dichlobenil	1.0 + 6.0	97	100	100	95	100	99	95
Paraquat + Oxadiazon	0.5 + 4.0	71	82	95	80	45	0	0
Glyphosate	2.25	87	98	95	98	100	82	84
Glyphosate + Dichlobenil	2.25 + 6.0	98	100	100	100	100	97	95
Glyphosate + Simazine	2.25 + 2.4	100	100	97	100	98	93	78
Glyphosate + Napropamide + Simazine	2.25 + 4.0 + 0.8	94	100	100	92	98	97	84
Weedy Check		0	0	0	0	0	0	0
Van Variety								
Paraquat	1.0	32	41	83	91	67	0	0
Paraquat + Dichlobenil	1.0 + 6.0	92	100	100	100	100	92	91
Paraquat + Oxadiazon	0.5 + 4.0	63	77	96	89	39	0	0
Glyphosate	2.25	96	100	86	100	89	82	93
Glyphosate + Dichobenil	2.25 + 6.0	100	100	100	100	100	100	97
Glyphosate + Simazine	2.25 + 2.4	100	100	100	93	100	85	93
Glyphosate + Napropamide + Simazine	2.25 + 4.0 + 0.8	100	100	100	100	100	80	94
Weedy Check		0	0	0	0	0	0	0

1/ All treatments containing Paraquat received Ortho X-77 at 8 oz./100 gal. solution
2/ Rate expressed in lb ai/A.
3/ OG=orchardgrass, BG=bluegrass, DB=downy brome, NLV=narrowleaf vetch, LG=legumes (alfalfa, red clover, white clover), DL=dandelion, FBW=field bindweed

Control of herbaceous plants in 'Delicious' apples. Brenchley, R. G. Field trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho to evaluate pre and post emergence herbicides for broad-spectrum, long-residual control of herbaceous vegetation in red and 'Golden Delicious' apples. Goldspur and Redspur type 'Delicious' apple trees were planted in the spring of 1970 and 1971. Trees were planted 8.5 feet apart on 20 foot row spacings. Trees were irrigated through corrugated furrows.

Native ground cover consisted primarily of orchardgrass, bluegrass, downy brome, dandelion, field bindweed, legumes (alfalfa, white clover, red clover), with minor infestations of perennial groundcherry and showy milkweed.

Herbicide applications were made November 1, 1979, and March 14, 1980. Environmental conditions at the time of herbicide application were as follows: (November 1, 1979, air temperature 52 F, soil temperature 43 F, relative humidity 55%, wind NW 7 mph, cloud cover 0, soil moist to surface), (March 14, 1980, air temperature 45 F, soil temperature 40 F, relative humidity 62%, wind SW 5 mph, cloud cover 60%, soil dry top 1 inch of soil surface). Soil was a silt loam, 1.3% organic matter, pH 7.2, with a CEC of 17 meq. Plot size was 7 by 25.5 feet (3 trees). Herbicide treatments were replicated four times per red 'Delicious' variety and three times for the 'Golden Delicious' variety. Plot design was a randomized complete block. Herbicide applications were made using a CO_2 propelled knapsack sprayer equipped with two 8004 nozzles delivering 46 gpa at 31 psi. Dichlobenil 4G was applied using a quart jar with perforated lid, 3 passes per plot. Plots were evaluated May 29, 1980.

Rainfall amounts consisted of 1.43 inches in October 1979, .83 inches in November, 1.57 inches in December 1979, 1.78 inches in January 1980, 1.58 inches in February 1980, 1.51 inches in March 1980, .55 inches in April 1980, 2.04 inches in May 1980.

Outstanding treatments were glyphosate + dichlobenil and paraquat + dichlobenil. Results of glyphosate for the control of field bindweed were rather disappointing in these trials; however, since both of the post emergence chemicals (glyphosate, paraquat) were tank-mixed with the residual components (simazine, napropamide, diuron, terbacil) there may have been some antagonistic affect which has been reported previously by several investigators. Field bindweed was controlled much better in experiments on sweet cherries and prunes when glyphosate was applied in late September or early October followed by soil residual treatments in November or March. Crop injury was no problem except with high rates of dichlobenil which showed very minor symptoms on a few isolated trees. Symptoms appear as minor chlorosis around the extreme outer margins of the leaves. These symptoms were noticed on only a few leaves per tree. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Table 1. Weed control in red 'Delicious' apples

Treatment[1/]	Rate[2/] lb/Acre	Time of Application	Percent Weed Control[3/] BG	OG	LG	DL	FBW
Paraquat CL	1.0	Fall	20	22	0	0	0
Paraquat CL + Simazine	1.0 + 3.2	Fall	83	81	0	0	0
Paraquat CL + Napropamide	1.0 + 4.0	Fall	41	53	0	0	0
Paraquat CL + Oxadiazon	0.5 + 4.0	Fall	17	8	0	0	0
Paraquat CL + Napropamide + Simazine	1.0 + 4.0 + 0.8	Fall	74	75	0	0	0
Paraquat CL + Oxadiazon + Simazine	0.5 + 4.0 + 0.8	Fall	80	77	0	0	0
Paraquat CL + Dichlobenil	1.0 + 6.0	Fall/Spring	100	100	100	100	95
Paraquat CL + Terbacil	1.0 + 1.8	Fall	92	97	57	37	0
Paraquat CL + Diuron + Terbacil	1.0 + 1.2 + 1.2	Fall	85	100	100	35	0
Paraquat CL + Diuron + Diuron	1.0 + 1.6 + 1.6	Fall/Spring	71	77	0	0	0
Glyphosate	2.25	Fall	95	98	85	55	20
Glyphosate + Simazine	2.25 + 3.2	Fall	98	100	82	92	37
Glyphosate + Simazine	2.25 + 3.2	Fall/Spring	96	100	100	90	33
Glyphosate + Napropamide + Simazine	2.25 + 4.0 + 0.8	Fall	100	100	97	91	0
Glyphosate + Diuron	2.25 + 3.2	Fall	98	97	80	63	25
Glyphosate + Diuron	2.25 + 3.2	Fall/Spring	96	91	97	82	30
Glyphosate + Terbacil	2.25 + 1.8	Fall	97	100	91	77	41
Glyphosate + Dichlobenil	2.25 + 6.0	Fall/Spring	100	100	100	100	87
Simazine	3.2	Fall	74	85	42	0	0
Check	0		0	0	0	0	0

1/ All Paraquat CL treatments were applied with Ortho X-77 at 8 oz/100 gal. solution.
2/ All rates are expressed as ai/A.
3/ BG=bluegrass, OG=orchardgrass, LG=legumes (alfalfa, white clover, red clover), DL=dandelion, FBW=field bindweed

Control of herbaceous plants in 'Italian' prunes. Brenchley, R. G. Herbicide evaluation trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho to evaluate potential pre and post emergence herbicides for weed control in 'Italian' prunes. 'Italian' prunes were planted April 11, 1969. Prune trees were planted 20 feet apart on 24 foot row spacings. Trees were irrigated through corrugated rows.

Native ground cover consisted of orchardgrass, bluegrass, downy brome, prickly lettuce, narrowleaf vetch, dandelion, field bindweed, and legumes (alfalfa, white clover, red clover).

Herbicide applications were made October 1, 1979 (glyphosate, oxadiazon, paraquat), November 6, 1979 (napropamide, simazine), March 13, 1980 (dichlobenil). Environmental conditions at the time of herbicide application were as follows: (October 1, 1979, air temperature 74 F, soil temperature 60 F, relative humidity 35%, wind SW 3 mph, cloud cover 0%, soil moist to surface), (November 6, 1979, air temperature 50 F, soil temperature 44 F, relative humidity 65%, wind SW 1 mph, cloud cover 0%, soil moist to surface), (March 13, 1980, air temperature 42 F, soil temperature 39 F, relative humidity 47%, wind SW 7 mph, cloud cover 100%, soil moist to surface). Soil was a silt loam, 1.4% organic matter, pH 7.1, with a CEC of 17 meq. Plot size was 7 by 48 feet (2 trees). Herbicide treatments were replicated four times. Plot design was a completely randomized design. Herbicide applications were made using a CO_2 propelled knapsack sprayer equipped with two nozzles (150 degree tips delivering 30 gpa at 30 psi October 1, 1979, 8004 nozzles delivering 44 gpa at 30 psi November 6, 1979). Dichlobenil 4G was applied using a quart jar with perforated lid, 3 passes per plot. Plots were evaluated May 14, 1980.

Rainfall amounts consisted of 1.43 inches in October 1979, .83 inches in November, 1.57 inches in December 1979, 1.78 inches in January 1980, 1.58 inches in February 1980, 1.51 inches in March 1980, .55 inches in April 1980, 2.04 inches in May 1980.

Glyphosate + dichlobenil was the outstanding treatment providing excellent broad-spectrum, residual weed control. Glyphosate + simazine, glyphosate + napropamide + simazine were good treatments but were somewhat weaker on dandelion and field bindweed. Glyphosate provided excellent weed control until mid-April after which downy brome, prickly lettuce, dandelion and field bindweed quickly reinfested this treatment. Paraquat + dichlobenil and paraquat + napropamide + dichlobenil provide good to excellent control of all weed species present except field bindweed. Only one tree in the entire experiment showed slight herbicide injury symptoms (dichlobenil 6.0 lb ai/A). This injury appeared as minor chlorosis around the extreme margins of the leaf (halo effect). (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Residual weed control in 'Italian' prunes

Treatment[1/]	Rate[2/] lb/A	Percent Weed Control[3/] OG	BG	DB	DL	LG	PL	FBW
Paraquat	1.0	25	20	92	0	0	0	0
Paraquat + Dichlobenil	1.0 + 6.0	96	99	96	93	96	85	40
Paraquat + Napropamide + Dichlobenil	1.0 + 4.0 + 3.0	92	95	87	97	89	100	50
Paraquat + Oxadiazon + Dichlobenil	0.5 + 4.0 + 3.0	88	91	98	95	52	75	63
Glyphosate	2.25	99	99	75	87	100	75	76
Glyphosate + Dichlobenil	2.25 + 6.0	100	100	100	100	100	100	90
Glyphosate + Simazine	2.25 + 2.4	100	100	100	87	100	100	82
Glyphosate + Napropamide + Simazine	2.25 + 4.0 + 0.8	100	100	98	80	100	100	79
Weedy Check	0	0	0	0	0	0	0	0

1/ Treatments containing Paraquat were applied with Ortho X-77 at 8 oz/100 gal. solution.

2/ All rates are expressed as lb ai/A.

3/ OG=orchardgrass, BG=bluegrass, DB=downy brome, DL=dandelion, LG=legume (alfalfa, white clover, red clover), PL=prickly lettuce, FBW=field bindweed

The effect of several new post- and preemergence herbicides on young peach, plum and prune trees in their second leaf. Lange, A. H. and J. T. Schlesselman. In January of 1980 young Fantasia Elberta peach trees on nemaguard, Roysum plums on marianas, and French prunes on myrobalan rootstocks were planted in a Hanford fine sandy loam at the Kearney Field Station in randomized block design as guard rows to a longterm cultural trial in Field 61. Each treatment was replicated three times in each tree species. The eight preemergence herbicides and two postemergence herbicides were applied February 27, 1980 and it rained the same night for a total of 0.14 inches. Shortly after this initial rain was a second storm which delivered 0.92 inches of rain. The soil is a Hanford sandy loam with 59% sand, 33% silt, 8% clay and 0.5% organic matter. The plots were 15 ft. by 7 1/2 ft. The postemergence sprays were applied so that 6 to 8 inches of the trunk were treated.

On April 15, 1980 the general weed control was rated and the species present were recorded. Both fluridone and NC 20484 gave good weed control. Some weeds must have been germinated on February 27 since control with glyphosate was definitely better than most other herbicides especially MSMA and the untreated check. If this is true, simazine must have overtaken the species. It also explains why neither napropamide nor oryzalin gave very good general weed control. A later rating (May 13, 1980) was similar except the longterm residual control with simazine and fluridone. It is difficult to explain the apparent residual control with 8 lb/A of glyphosate, but it should be noted. MSMA appeared to show some reduction in growth.

The activity of ten herbicides on weeds and trunk diameters for young stone fruits (425-73-501-115-1-80)

Herbicides	lb/A	Average 1/ Weed Control 4/15/80	5/13/80	Average 2/ Trunk Diameters Prunes	Peaches	Plums
Simazine	2	7.7	9.3	25.0	31.7	33.3
Napropamide	4	5.6	6.1	25.0	36.7	31.7
Oryzalin	4	6.1	6.2	25.0	40.0	40.0
Oxyfluorfen	4	7.7	8.6	31.7	38.3	40.0
Norflurazon	4	5.7	5.6	26.7	36.7	38.3
Norflurazon	8	7.9	8.9	30.0	40.0	38.3
Fluridone	1	7.1	7.8	26.7	41.7	41.7
Fluridone	2	8.6	9.6	25.0	43.3	41.7
NC 20484	2	4.1	3.4	32.5	30.0	36.7
NC 20484	8	8.4	8.8	35.0	40.0	36.7
0 28269	4	4.4	4.4	25.0	40.0	41.7
0 28269	8	6.6	6.6	31.7	38.3	40.0
Glyphosate	8	7.3	8.0	23.3	31.7	33.3
MSMA	8	1.3	0.4	13.3	21.7	31.7
Check	-	2.7	1.3	20.0	26.6	36.7

1/ Average of 9 replications where 0 = no control and 10 = complete control. Treated 2/27/80.
2/ Average of 3 replications. Measurements taken in mm. on 10/9/80.

Puncturevine control in young nursery trees. Lange, A. H. Puncturevine is a common weed in young orchards and in nurseries. Because of its ability to germinate deeply in the soil, it is not easily controlled by surface applied preemergence herbicides.

In this test, herbicides were applied August 21, 1979 and again repeated on March 18, 1980 to young furrow-irrigated trees in nursery rows. The soil is a Vista sandy loam with less than 1% organic matter.

At two months after treatment, oxyfluorfen and a numbered herbicide, R 40244, were giving outstanding puncturevine control. After the repeat application, the numbered compound and fluridone, herbicides similar in their activity on trees and plants, gave outstanding puncturevine control. Neither of these herbicides are presently available but both are being studied as longterm herbicides for weed control in trees and vines. (University of California, Kearney Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648).

The effect of fall and spring preemergence herbicides on the control of puncturevines in an orchard nursery (425-54-501-125-1-79).

Herbicides	lb/A	Puncturevine Control[1/] Two Months	Seven Months
Simazine	2	8.8	5.6
Napropamide	4	6.4	5.3
Napropamide	16	6.0	5.6
Oryzalin	4	5.4	6.5
Oryzalin	16	6.8	7.4
Oxyfluorfen	2	9.0	6.0
Oxyfluorfen	8	10.0	7.8
Norflurazon	2	8.7	8.3
Norflurazon	8	8.4	7.7
Fluridone	1	6.7	10.0
Fluridone	4	8.7	10.0
R 40244	2	8.4	8.3
R 40244	8	10.0	9.8
MBR 18337	4	7.4	1.8
NC 20484	4	8.4	5.9
Check	-	3.8	4.8

1/ Average of 12 replications where 0 = no puncturevine control and 10 = best control. Treated 8/21/79 and 3/18/80. Evaluated 10/18/79 and 3/18/80. No phytotoxicity was observed.

The effect of postemergence herbicides on semi-dormant newly planted grapevines. Lange, A. H. Six mixed varieties of wine grapes and two table grapes were planted December 1, 1979 and treated March 7, 1980 at average bud break for all varieties. Each treatment was replicated nine times in a randomized block design. Oryzalin was applied down the furrows and grape rows at 8 lb/A to reduce the effects of weeds. The grape foliage was rated April 20 and again on June 5 for symptoms and grapevine vigor.

The early rating showed little in the way of symptoms except for 2,4-D which substantiates earlier work. By the second evaluation most symptoms were gone and even the injury in the 2,4-D plots was less. Only the 2 lb/A rate sprayed on breaking buds caused a lasting effect of the total growth of the vine. There appeared to be substantial difference in varietal response but it was not possible to sort these out because of labeling problems. There were enough important grape varieties present to get an overall comparison of comparative damage of these herbicides to early grape growth. It is important to recognize the amount of 2,4-D necessary to cause significant effects on the total growth of these young vines when application was made at bud break.

The effect of postemergence herbicides on dormant rooted grape cuttings in the bud break stage (425-73-501-105-1-80)

Herbicides	lb/A	Average[1/] Grape Phytotoxicity 4/20/80	6/5/80	Average[2/] Vigor 6/5/80
Oxyfluorfen	1	0.3	0.0	8.1
Oxyfluorfen	2	1.1	0.2	8.6
Paraquat+X-77	1/2+1/2%	0.4	0.2	7.4
Paraquat+X-77	1+1/2%	0.8	0.7	8.0
Glyphosate	2	0.7	0.3	7.7
Glyphosate	4	0.8	0.5	8.1
Amitrol	2	0.3	0.4	9.0
Amitrol	4	1.1	0.6	8.6
2,4-D	1	3.2	2.9	7.9
2,4-D	2	5.3	3.6	4.7
Dinoseb	10	1.1	0.2	9.6
Dinoseb	20	0.1	0.0	7.6
Dinoseb+N.P. Oil	10+2 Gal.	0.1	0.4	8.2
Check	-	0.1	0.9	8.3

1/ Average of 9 replications where 0 = no phytotoxicity and 10 = plant completely dead.

2/ Average of 9 replications where 0 = no vigor, no growth and 10 = most vigorous growth.
Sprayed at bud break 3/7/80.

Effect of weed competition on leaf nitrogen levels in citrus. Jordan, L. S., R. C. Russell, and R. Krueger. The effect of weed competition on leaf nitrogen was evaluated in a Valencia orange grove in Riverside, California. The study was initiated in the spring of 1979. The plots include an established (3 year) annual weed growth under both furrow and sprinkler irrigation, established bermudagrass under sprinklers, and recently planted plots of annual weeds under furrow irrigation and bermudagrass under sprinklers. Beginning in the spring of 1979, half of each area was periodically treated with paraquat to create weed-free plots.

The leaf nitrogen levels in 1978 (before the start of Paraquat treatments) and 1979 are presented in the Table. In 1978, nitrogen was lowest in trees in the established bermudagrass plot, and highest in the recently established bermudagrass and annual weed plots. Leaf nitrogen level was intermediate in the established annual weed plots. Leaf nitrogen declined from 1978 to 1979 in the untreated plots. The decline was less pronounced in the bermudagrass plots (both established and new). Citrus leaf nitrogen increased from 1978 to 1979 in all treated plots, except for the new bermudagrass plots, where it declined in 1979. Leaf nitrogen of trees in treated plots was significantly higher than that of trees in untreated plots, except for the new bermudegrass plots where there was no significant difference. (Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

Leaf nitrogen levels in Valencia orange trees grown under various weed populations and management practices.

Weed cover and irrigation	Paraquat treatment	Leaf nitrogen (%) 1978	Leaf nitrogen (%) 1979
Established annual weeds			
Furrow	-	2.24	1.90
	+	-	2.39
Established annual weeds			
Sprinkler	-	2.21	1.97
	+	-	2.48
Recently planted weeds			
Furrow	-	2.58	2.23
	+	-	2.69
Established Bermudagrass			
Sprinkler	-	1.97	1.91
	+	-	2.46
Recently planted Bermudagrass			
Sprinkler	-	2.49	2.44
	+	-	2.41

Effect of weed competition on soil moisture levels in citrus. Jordan, L. S. and R. Krueger. The effect of various weed populations on soil moisture levels was evaluated in a Valencia orange grove at Riverside, California. The weed populations were: annual weeds established for 3 years under furrow or sprinkler irrigation, recently planted annual weeds under furrow irrigation, burmudagrass established for 3 years under sprinkler irrigaiton, and recently planted bermudagrass cover under sprinkler irrigation. Half of each weed-irrigation plot was sprayed as needed with Paraquat to establish a weed-free area. The plots were irrigated for 48 hours every 3 weeks from April to January. Soil moisture was measured using a neutron moisture probe. Measurements were taken at 9, 18 and 36 inch depths in the furrow bottom by the tree and half-way between trees in the row, under trees in the center of the open drive area between tree rows, and between the trees in the rows.

In furrow-irrigated plots, soil moisture did not vary much with location, except in the open drive areas which were considerably drier (Table 1). The sprinkler-irrigated plots had about the same soil moisture at all locations. Average soil moisture did not vary much between weedy and weed-free plots throughout the year (Table 2). The different weed populations also had little effect on soil moisture levels. The top portion of the soil became drier during the summer, but moisture increased in fall. The moisture level at lower depths remained relatively constant throughout the year. (Department of Botany and Plant Sciences, University of California, Riverside CA 72521)

Table 1. Soil moisture at 3 depths at various locations in a Valencia orange orchard during July

Weed population	Irrigation	Paraquat treatment	Soil moisture (%) Furrow by tree Depth, inches 9	18	36	Furrow between trees Depth, inches 9	18	36	Between trees in row Depth, inches 9	18	36	Center open area Depth, inches 9	18	36
Established annual weeds	Furrow	-	20	31	37	19	28	35	18	29	36	8	21	32
		+	21	31	35	22	31	35	29	34	36	4	18	31
Established annual weeds	Sprinkler	-	22	28	30	23	27	31	19	27	25	20	30	31
		+	22	26	31	8	17	21	9	16	22	17	30	35
Recently planted annual weeds	Furrow	-	25	34	36	23	31	36	25	30	36	6	16	26
		+	23	30	35	20	29	34	9	19	25	7	16	25
Established bermudagrass	Sprinkler	-	23	30	32	23	28	29	26	20	27	26	32	36
		+	21	30	31	21	29	31	21	24	25	19	28	32
Recently planted bermudgrass	Sprinkler	-	20	31	35	21	31	34	12	19	28	26	31	35
		+	22	31	33	21	30	32	13	22	31	20	29	31

Table 2. Soil moisture at 3 depths in Valencia orange orchard with various weed populations and irrigation regimes.

			Soil mositure (%)											
		Paraquat	April			July			September			November		
Weed population	Irrigation	treatment	9	18	36	9	18	36	9	18	36	9	18	36
Established annual weeds	Furrow	+	14	29	37	23	30	36	12	24	34	14	27	33
		-	20	33	36	19	30	35	12	25	33	15	28	33
Established annual weeds	Sprinkler	+	24	31	33	19	26	31	11	19	27	14	22	28
		-	25	31	35	20	27	32	7	17	23	12	23	29
Recently planted annual weeds	Furrow	+	29	32	36	23	30	35	10	21	31	16	26	30
		-	25	35	36	22	33	36	15	26	34	20	30	33
Established bermudagrass	Sprinkler	+	25	31	33	20	29	32	11	23	30	17	27	30
		-	29	32	37	24	30	35	11	21	28	18	26	31
Recently planted bermudagrass	Sprinkler	+	28	32	31	22	30	31	14	24	30	19	27	31
		-	23	31	36	19	30	35	15	24	33	17	28	32

Effect of weeds on moisture stress in citrus. Jordan, L. S., and R. Krueger. Leaf water potential was measured in order to evaluate moisture stress in Valencia orange trees growing in several weedy situations. These were: (1) established annual weeds (3 years) with furrow irrigation; (2) established annual weeds (3 years) with sprinkler irrigation; (3) recently planted weeds with furrow irrigation; (4) established bermudagrass with sprinkler irrigation; (5) recently planted bermudagrass with sprinkler irrigation. Half of each area was sprayed with paraquat at regular intervals to obtain weed-free checks.

Leaf water potential is a measure of water availability to a plant. Its maximum value is 0, and lower (more negative) values are associated with decreased water availability (i.e. greater moisture stress). Leaf water potential is at its highest (least negative) just before dawn, and at its lowest (most negative) at mid-day. Water potentials of Valencia orange leaves were measured pre-dawn and mid-day using the pressure bomb technique.

The effect of the various weed populations on the leaf water potential of the orange trees varied (See Table). In furrow- and sprinkler-irrigated plots with established annual weeds, the trees had significantly lower water potentials than those in the corresponding weed-free plots. The lower water potential occurred both pre-dawn and mid-day throughout the year. In plots with recently planted annual weeds under furrow irrigation, there was no significant difference in water potential between trees in weedy and weed free plots in January, April, or October, but in July, the water potential of trees in the weedy plot was significantly lower than that of those in the weed free plots (both pre-dawn and mid-day). Trees in plots with an established bermudagrass cover had significantly lower water potentials (both pre-dawn and mid-day) than those in weed free plots in January, April, and October. In July, the trees in the established bermudagrass plots had significantly lower pre-dawn water potentials than those in the weed-free plots, but mid-day water potentials were significantly lower in trees in the weed-free plots. Trees in plots with a recently planted bermudagrass cover had significantly lower pre-dawn potentials than trees in treated plots in January and April; at mid-day there were no significant differences. In July, both pre-dawn and mid-day water potentials were lower in the newly planted bermudagrass plots. In October, there were no significant differences. For the plots in general, mid-day water potential increased from January to April, decreased to a minimum in July, and increased in October, while pre-dawn water potentials increased from January to April, then decreased in July and October. (Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

Leaf water potential of Valencia orange trees with weeds and in weed-free situations.

		leaf water potential (-bars)[1/, 2/]							
		January		April		July		October	
Vegetation + irrigation	Paraquat treatment	pre-dawn	mid-day	pre-dawn	mid-day	pre-dawn	mid-day	pre-dawn	mid-day
Established annual weeds, furrow	-	8.0	14.1	5.3	11.1	7.0	19.4	6.8	13.7
	+	6.2*	10.2*	4.2*	7.5*	5.5*	17.3*	5.8*	12.4*
Established annual weeds, sprinkler	-	8.4	14.3	5.0	9.9	6.6	19.3	7.1	14.1
	+	6.4*	9.6*	4.4*	8.4*	5.0*	15.7*	6.1*	12.9*
Recently planted weeds, furrow	-	7.1	12.8	4.6	9.2	5.6	16.9	7.7	14.5
	+	7.6ns	11.8ns	4.5ns	9.5ns	5.1*	14.8*	7.4ns	15.0s
Established bermudagrasss, sprinkler	-	7.8	12.4	5.2	9.8	5.4	13.1	7.1	14.1
	+	6.3*	10.1*	4.4*	7.7*	4.3*	14.6*	5.9*	12.6*
Recent planted bermudagrass, sprinkler	-	8.6	13.8	4.8	9.5	6.5	16.4	7.3	14.3
	+	7.7*	14.1ns	4.2*	8.8ns	5.5*	14.3*	7.0ns	14.1ns

1/ Monthly averages.
2/ * = significantly different at 0.05 level.
ns = not significantly different at 0.05 level.

Oryzalin and napropamide for weed control in lemons. Jordan, L. S. and R. C. Russell. Plots were established in a 1-year-old planting of Eureka lemons near Thermal, California. The soil was Coachella fine sandy loam and the trees were irrigated in 10-foot wide basins. All existing weed growth was removed from the plot area before herbicide treatment. Applications were made on March 28, 1978. Napropamide and oryzalin were applied at 2 treatment rates, alone and in combination, using a constant pressure CO_2 sprayer with a 3-nozzle boom. Tree-centered plots of 480 ft^2 were replicated 3 times. The plots were irrigated with 8 acre-inches of water immediately following treatment.

Weed control evaluations and observations for tree tolerance were made for 6 months following treatment (See Table). During the spring and summer months the untreated control plots developed a ground cover of pigweed sp, horseweed, lovegrass sp, and barnyardgrass. Oryzalin at 2 and 4 lb ai/A and napropamide at 4 and 8 lb ai/A were equally effective up to 10 weeks after treatment with slightly better control of the higher rates. In the later summer months oryzalin was considerably more effective than napropamide in controlling both lovegrass and watergrass. Combinations of oryzalin and napropamide at 2 + 4 and 4 + 8 lb ai/A were only slightly more effective than oryzalin alone at each treatment level. The young lemon trees were tolerant to all treatments. (Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

Weed control with napropamide and oryzalin in lemons[1/]

Herbicide[2/]	Rate lb/A	Average weed control[3/] 5/A	5/22	6/7	6/26	8/15	9/26
Oryzalin	2	10.0	9.7	9.6	8.8	7.7	6.5
Oryzalin	4	10.0	9.9	9.9	9.7	8.4	8.0
Napropamide	4	9.8	9.6	9.1	7.0	4.7	3.0
Napropamide	8	9.9	10.0	9.7	9.4	6.7	4.5
Oryzalin + Napropamide	2 + 4	9.9	10.0	9.9	9.5	7.6	5.4
Oryzalin + Napropamide	4 + 8	10.0	9.9	9.9	9.9	9.2	7.9

[1/] Weeds were pigweed sp, horseweed, lovegrass sp, and watergrass.
[2/] Treated March 28, 1978.
[3/] Based on 3 replications (0 = no control, 10 = complete kill).

The evaluation of a new nutgrass control herbicide in young almond trees. Fischer, B. B. and A. H. Lange. Young Texas and NonPareil almond trees growing in a dry Panoche clay loam soil heavily infested with nutsedge were treated in 8 by 250 ft. plots on December 19, 1979. The herbicides were applied in 74 gallons of water per acre.

The number of nutsedge tubers were significantly reduced at rates of 1/2 to 4 lb/A, however, foliar symptoms occurred at all rates. At the higher 2 and 4 lb/A rates the leaf symptoms were severe.

In a 1979 screening test at the Kearney Field Station in a Hanford fine sandy loam, this herbicide was safe on 11 varieties of newly planted trees in two experiments at rates up to 4 lb/A but showed some symptoms and reduction in growth at 8 lb/A. In a second trial conducted in the same soil on one year older trees, however, only the plums, out of three varieties showed slight symptoms at the 8 lb/A rate. No reduction in growth has been observed at the Kearney Field Station in one or two year-old trees. (University of California, Cooperative Extension, 1720 S. Maple, Fresno, CA 93702.)

Nutsedge weed control studies in almonds

Herbicides	Rate	Evaluated 5/29/80 % Infestation	Evaluated 5/29/80 Injury	Evaluated 7/17/80 % Infestation	Evaluated 7/17/80 Injury
NC 20484	1/2	33.3	1.3	66.0	1.0
NC 20484	1	23.3	1.6	50.0	1.6
NC 20484	2	11.6	4.3	15.0	2.6
NC 20484	4	4.0	5.0	10.0	5.0
Check	-	95.0	0.0	100.0	0.0

Evaluation of controlled droplet application of glyphosate on winter annual weeds in almonds. Kempen, H. M. and Joe Graf. Comparisons of the Micro-max applicator at 1.1 gpa or 5 gpa, two tractor mounted Herbi atomizers in tandem at 2 gpa and conventional 8002 nozzles at 20 gpa were made to berms in a 5 year old almond orchard on 2-29-80. Weeds were 1 to 8 inches when treated and the almonds were in full bloom. The esopropyl amine salt of glyphosate as formulated was applied at 1 lb. ai/a to 10 tree plots replicated 3 times (220 ft. by 6 ft.).

Results are shown in the table below. No significant differences were noted between application techniques at the rate of glyphosate used. Some evidence of spray displacement was noted from the 100 micron droplet size treatment. No tree injury was evident except where no hanging branches were contacted. No translocation was evident. (Univ. of Calif. Coop. Ext., P.O. Box 2509, Bakersfield, Ca. 93303.)

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Evaluation of C.D.A. on glyphosate performance

Application method	Droplet size (microns)	Diluent gpa	Weed control 1/ Cheeseweed 4-4-80	London rocket 3-16-80	London rocket 4-4-80	Shepherds-purse 3-16-80
Micro-max	240	5	8.3	10	10	10
Micro-max	100	1.1	8.3	10	10	10
Tandem Herbi	240	2	8.6	10	10	9.7
Nozzled boom	100-600	20	8.6	10	10	10
Check	--	--	0	0	0	0
		LSD .05 =	1.01	0.00	0.00	0.46
		LSD .01 =	1.47	0.00	0.00	0.67

1/ London rocket was 2 to 8 inches and blooming; annual bluegrass 4 inches, cheeseweed 1 to 4 inches, groundsel 2 to 4 inches and blooming, brass buttons 2 inches and blooming, horseweed 1 to 4 inches, shepherdspurse 4 inches,chickweed 6 inches and blooming. Rated 0 to 10: 0 = no effect; 10 = kill on dates indicated.

Evaluation of C.D.A. on glyphosate performance

Application method	Diluent gpa	Weed control 2/ Annual bluegrass 3-16-80	Annual bluegrass 4-4-80	Mares-tail 4-4-80	Ground-sel 4-4-80	Chick-weed 4-4-80	Brass buttons 4-4-80
Micro-max D.S. 240 μ 1/	5	7.0	7.3	10	10	10	10
Micro-max D.S. 100 μ	1.1	7.5	7.7	10	10	10	10
Tandem Herbi D.S. 240 μ	2	7.0	6.7	10	10	10	10
Nozzled boom D.S. 100-600 μ	20	6.3	8.8	10	10	10	10
Check	--	0	0	0	0	0	0
	LSD .05 =	1.38	3.11	0.00	0.00	0.00	0.00
	LSD .01 =	2.01	4.52	0.00	0.00	0.00	0.00

1/ D.S. (Droplet size in microns - μ)

2/ London rocket was 2 to 8 inches and blooming; annual bluegrass 4 inches, cheeseweed 1 to 4 inches, groundsel 2 to 4 inches and blooming, brass buttons 2 inches and blooming, horseweed 1 to 4 inches, shepherdspurse 4 inches, chickweed 6 inches and blooming.
Rated 0 to 10: 0 = no effect; 10 = kill on dates indicated.

Herbicide performance when applied with a Micro-max controlled droplet applicator. Kempen, H. M. and Joe Graf. Glyphosate, 2,4-D amine and oxyfluorfen, alone and in combinations were compared using a CDA applicator. The Micro-max applied these herbicides in 5 gpa of water diluent to almond tree berms. The atomizer made a 6 foot annular circle which overlapped in the tree row. Thus a 3 foot wide band received the indicated rate and 3 feet on each side received a half dosage. The unit was pulled by a Honda 110 high flotation vehicle at 4.5 mph. Plots were 220 ft. long, replicated 3 times. Weeds were 2 to 15 inches tall. Cheeseweed was most prevalent.

Results in tables 1 and 2 indicate that best overall control was achieved with the glyphosate salt at 2 lb. ai/a or oxyfluorfen plus 2,4-D amine at 1 and 2 respectively. Oxyfluorfen at 1 lb. ai/a, alone or in combination, and glyphosate at 2 lbs. ai/a were very effective against 2 to 8 in cheeseweed. Only glyphosate was effective on grass species. Adding 2,4-D to glyphosate reduced glyphosate activity markedly. No tree injury was evident. (Univ. of Calif., Coop. Ext., P.O. Box 2509, Bakersfield, Ca. 93303.)

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Table 1. Herbicide performance with Micro-max application

Treatments	Rate lbs AI/A	Weed control 1/ overall 2/ 4-9-80	overall 2/ 5-12-80	cheeseweed full rate 4-9-80	cheeseweed full rate 5-12-80	cheeseweed ½ rate 5-12-80	all comp. 3/ 5-12-80
glyphosate + oxyfluorfen	.5 + .5	9.4	7.7	9.4	8.7	6.7	9
glyphosate + oxyfluorfen	1 + 1	9.8	8.0	10	10.0	5.0	10
oxyfluorfen	1	7.7	8.2	9.3	10.0	7.7	9
"	2	6.3	6.7	9.2	10.0	7.9	8.7
glyphosate	1	6.0	7.5	4.0	9.5	7.0	10
"	2	8.9	9.0	7.7	9.8	8.3	10
glyphosate + 2,4-D amine	.5 + 1	8.5	7.5	7.3	8.7	5.5	10
glyphosate + 2,4-D amine	1 + 2	7.7	5.7	5.3	4.3	4.7	10
oxyfluorfen + 2,4-D amine	.5 + 1	7.3	5.3	8.8	9.0	4.7	10
oxyfluorfen + 2,4-D amine	1 + 2	7.7	8.7	9.3	10.0	9.7	10
Untreated	--	0	0	0	0	0	0
	LSD .05 =	1.25	3.17	0.70	2.58	3.77	1.71
	LSD .01 =	1.70	4.34	0.96	3.52	5.14	2.34

1/ Weed control rated 0-10: 0 = no control; 10 = kill; ave. of 3 reps.
2/ Refers to overall control within the 6 ft. band on either side of row; all weeds.
3/ All composites: includes groundsel, sowthistle, prickly lettuce. Weed size: cheeseweed 2 to 8 in.; chickweed 2 to 4 in.; shepherdspurse 12 in.; foxtail barley 12 in.; sowthistle 15 in.; groundsel 9 to 12 in.; bluegrass 4 in.

Table 2. Herbicide performance with Micro-max application on specific species

Treatment	Rate lbs AI/A	Weed control rating 1/ shepherds purse 4-9-80	foxtail barley 4-9-80	sow thistle 4-9-80	chick weed 4-9-80	ground sel 4-9-80	blue grass 4-9-80
Glyphosate + oxyfluorfen	.5 + .5	9	10	9.3	9.0	8.7	9.3
Glyphosate + oxyfluorfen	1 + 1	10	10	9.7	10.0	9.7	9.3
Oxyfluorfen	1	8	7.3	8.5	7.0	7.7	5.3
"	2	6.5	5.0	6.0	6.3	5.3	5.3
Glyphosate	1	9	10	--	9.0	8.0	5.0
"	2	10	10	10	10	10	10
Glyphosate + 2,4-D amine	.5 + 1	9	10	8.7	9.8	8.3	8.0
Glyphosate + 2,4-D amine	1 + 2	9.5	9.7	8.7	8.3	8.7	7.7
Oxyfluorfen + 2,4-D amine	.5 + 1	9.5	4.0	9.0	7.7	9.0	3.5
Oxyfluorfen + 2,4-D amine	1 + 2	9.5	4.7	9.3	7.3	8.7	2.7
Untreated	--	0	0	0	0	0	0
	LSD .05 =	0.91	1.33	--	1.43	1.52	2.83
	LSD .01 =	1.25	1.82	--	1.96	2.07	3.86

1/ Weed control rated 0-10: 0 = no control; 10 = kill; ave. of 3 replications

Weed size: Cheeseweed 2 to 8 inches; chickweed 2 to 4 inches; shepherdspurse 12 inches; foxtail barley 12 inches; sowthistle 15 inches; groundsel 9 to 12 inches; bluegrass 4 inches.

Weed control in drip irrigated pistachios. Fischer, B. B. and A. H. Lange, On January 23, 1974 a two year-old Atlantica pistachio orchard was treated with seven preemergence herbicides applied alone and in combination to three-tree plots (45 ft. by 10 ft.) with four replications. The orchard was in a San Joaquin loam soil under drip irrigation. These initial treatments have subsequently been followed by six annual applications with the same herbicides.

The results in the following table show the weed control activity evaluated May 3, 1980; five months since the previous retreatment on December 11, 1979. Most of the herbicides still showed very good activity, including all the treatments containing oxyfluorfen, as well as the combination of simazine plus prodiamine. Only napropamide alone was unsatisfactory. It was particularly weak in the wet zone. (University of California, Kearney Field Station, 9240 S. Riverbend Ave., Parlier, CA 93648).

Comparison of seven preemergence herbicides on annual weeds in a pistachio orchard under drip irrigation (425-10-501-148-4-79)

		Weed Control 1/		
Herbicides	lb/A	In Drip Area	Out Drip Area	Phytotoxicity 2/
Oxyfluorfen+Napropamide	2+4	5.8	8.8	0.0
Napropamide	8	2.8	6.0	0.0
Simazine+Napropamide	1/2+4	8.0	10.0	0.0
Simazine+Napropamide	1+8	8.3	10.0	0.0
Oxyfluorfen	1 1/2	9.1	10.0	0.0
Oxyfluorfen	3	9.3	10.0	0.0
Simazine+Oryzalin	1+4	9.9	10.0	0.0
Simazine+Oryzalin	2+8	9.8	10.0	0.0
Simazine+Oxyfluorfen	1+2	9.9	10.0	0.0
Simazine+Oxyfluorfen	2+4	10.0	10.0	0.0
Oxadiazon+Napropamide	2+2	6.8	10.0	0.0
Oxadiazon+Napropamide	4+4	9.3	9.3	0.0
Simazine+Prodiamine	1+2	9.5	10.0	0.0
Simazine+Prodiamine	2+4	10.0	10.0	0.0
Oryzalin	4	7.4	10.0	0.0
Oryzalin	8	8.8	10.0	0.0
Oxyfluorfen+Oryzalin	2+2	9.1	10.0	0.0
Oxyfluorfen+Oryzalin	4+4	10.0	10.0	0.0
Check	-	0.0	0.0	0.0

1/ Average of 4 replications where 0 = no weed control and 10 = complete weed control. Weeds present: Pigweed, Lovegrass, Barnyardgrass.

2/ Average of 4 replications where 0 = no phytotoxicity and 10 = plant dead. Treated 1/23/74, 11/13/74, 11/20/75, 11/18/76, 12/12/77, 1/8/79, 12/11/79. Evaluated 5/3/80.

Simulating herbicide injection through drip emitters in young pistachio trees. Lange, A. H. First and second leaf pistachio rootstocks were planted in a sand culture inside 30 L cement pots during March 1979 and 1980. The trees were irrigated with a drip system, one emitter per pot. On May 6, 1980, a 10 L suspension of five herbicides at 20 ppm each was used to treat the growing pistachios (replicated four times).

An evaluation on October 8, 1980 showed no phytotoxicity (see table). The pistachios reflected less tolerance to the norflurazon than did the almonds in early trials so this herbicide was not included in the 1980 trials.

Earlier weed control rating resulted in only napropamide showing comparatively poor activity on spotted spurge; by far the dominant weed species in the test. The weeds in this test were sprayed out with glyphosate on several occasions.

These results suggest that single applications or even repeated annual applications of 20 ppm through the emitter to growing pistachios would not be phytotoxic. (University of California, Kearney Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648.)

The effect of treating young pistachio trees
and the control of spurge growing in a sand culture
(425-73-506-145-1-79)

Herbicides	ppm	Average 1/ Diameters	Average 2/ Spurge Control
Napropamide	20	32.5	4.1
Oryzalin	20	28.2	4.5
Oxadiazon	20	27.5	5.6
Oxyfluorfen	20	26.9	8.8
Prodiamine	20	25.0	8.3
Check	-	26.9	4.2
LSD .05		NS	

1/ Average of 8 replications, 4 in first leaf and 4 in their second leaf. Diameters taken at 10 cm. from ground level. Diameters measured in mm. Treated 5/6/80. Evaluated 10/8/80.

2/ Average of 8 replications where 0 = no control and 10 = best spurge control.

The use of preemergence herbicides for control of annual weeds in pistachios under drip irrigation. Vargas, R. G. and A. H. Lange. A study was established in a five year-old pistachio orchard under a drip irrigation system, in Madera County on November 21, 1975 to determine the effect of preemergence herbicides over a prolonged period of time. Retreatments were made on November 15, 1976; December 21, 1977; December 12, 1978 and December 9, 1979 to the orchard which is under drip irrigation and growing on San Joaquin loam. Treatments were applied with a CO_2 sprayer at 30 psi with 50 gallons of water per acre. Annual weed control ratings were made on March 14, 1980. The evaluation made on this date indicated that all treatments except for the 1/2 and 1 lb. of simazine were controlling the annual weeds effectively (see table).

No phytotoxicity to the pistachios has been observed to this point. (University of California, Kearney Field Station, 9240 S. Riverbend Ave., Parlier, CA 93648.)

Comparison of preemergence herbicides used in pistachios
and their effect on annual weeds after five annual applications
(425-20-501-148-1-76)

Herbicides	lb/A	Phytotoxicity 1/	Annual Weed Control 2/	Weeds Present 3/
Simazine	1/2	0.0	5.8	F,S,T
Simazine	1	0.0	6.0	F
Simazine	2	0.0	8.0	F
Simazine+Napropamide	1+4	0.0	7.5	F,L
Simazine+Oryzalin	1+4	0.0	7.3	F,L
Norflurazon	4	0.0	7.3	F,L
Oxyfluorfen+Norflurazon	2+2	0.0	8.5	M
Oxyfluorfen+Napropamide	2+4	0.0	9.5	L
Oxyfluorfen+Oryzalin	2+4	0.0	9.3	L
Check	-	0.0	0.0	F,S,T,L,M,C,H

1/ Average of 4 replications where 0 = no phytotoxocity and 10 = plant dead.
2/ Average of 4 replications where 0 = no control and 10 = complete control.
3/ Weeds present: F-Filaree, S-Smooth catsear, T-Foxtail, L-Flaxleaf fleabane, M-Marestail, C-Common groundsel, H-Soft chess. Treated 11/21/75, 11/5/76, 12/21/77, 12/12/78, and 12/9/79. Evaluated 3/14/80.

Effectiveness of 2,4-D plus 2,4-DP on turf weed control. Anderson, J. L., W. F. Campbell, and L. A. Rupp. Commercial mixtures of 2,4-D and 2,4-DP were applied as liquid or granular formulations to established Kentucky Bluegrass turf in Liberty Park in Salt Lake City, Utah in 1977, 1978, and 1979. Excellent control of common dandelion, broadleaf plantain, and prostrate knotweed was obtained with 2 + 2 lb/A of the ester formulation applied in September of 1977. Granular formulations of 2,4-D + 2,4-DP at 2 + 2 and 3 + 3 lb/A were applied July 28, 1978 in comparison with granular silvex + 2,4-D at 1 + 2 lb/A. Temperatures exceeded 33 C daily for two weeks following treatment application. Even though plots were sprinkled on an alternate day basis no appreciable weed control was obtained with any treatment in 1978. It was thought that the chemicals volatilized under the high temperatures before they were effectively absorbed.

On October 12, 1979 liquid formulations were again applied to weedy sections of turf with a carbon dioxide hand sprayer in 50 gal. water/A. Plots were evaluated three weeks later and again the following May. 2,4-D + dicamba gave the quickest weed control in the fall but showed no difference from control provided by 2,4-D + 2,4-DP the following spring (see table below).

Effect of herbicide treatments on broadleaf weed control in Kentucky Bluegrass turf

Treatment[2]	Rate (lb/A)	Weed Control[1] November 3, 1979	Weed Control[1] May 15, 1980
2,4-D (oil soluble amine)	3	7.9	9.2
2,4-D + dicamba	2.5 0.25	9.5	9.5
2,4-D (diethylamine)	2	6.2	8.0
2,4-D + 2,4-DP (ester)	1.5 1.5	8.6	9.3
2,4-D + 2,4-DP (amine)	1.5 1.5	8.4	9.3
bromoxynil	0.5	2.4	4.8
untreated	---	0	0

[1]rated visually on 0-10 basis; 10 = complete control of broadleaf weeds

[2]treatments applied October 12, 1979

To determine the tolerance of turf grasses to 2,4-D + 2,4-DP, the ester formulation at 1 + 1 lb/A was applied to two replications of each of eleven turfgrass cultivars on October 10, 1980. The plots, established in the spring of 1980, were: 1. Zoysia; 2. FuTurf; 3. Merion Kentucky Bluegrass; 4. Lawn Misture (90% common Kentucky Bluegrass, 10% White Dutch Clover); 5. Magic Carpet (33% Parade Kentucky Bluegrass, 33% Baron Kentucky Bluegrass, 33% Merion Kentucky Bluegrass); 6. Patio N Shade (50% common Kentucky Bluegrass, 35% Citation Perennial Ryegrass, 15% Creeping Red Fescue); 7. Common Kentucky Bluegrass; 8. Park Kentucky Bluegrass; 9. Family Brand Mixture (40% Chewings

Fescue, 28% common Kentucky Bluegrass, 22% Victa Kentucky Bluegrass, 10% Pennlawn Fescue); 10. Victa Kentucky Bluegrass; and 11. Creeping Red Fescue. The herbicide was applied in 40 gal. water/A with a Meter Miser. Excellent broad leaf weed control was achieved with the treatment. The only turfgrass injured by the mixture was #4 where the White Dutch Clover was essentially removed from the Kentucky Bluegrass. No phytotoxicity was observed to any of the grasses before they went dormant in late fall. Zoysia did show a browning of the distal portion of the leaf blade shortly after treatment, but this also was evident in the untreated plots and was probably due to cooling fall temperatures rather than herbicide treatment. (Plant Science Department, UMC 48, Utah State University, Logan, UT 84322)

PROJECT 5

WEEDS IN AGRONOMIC CROPS

Richard D. Gibson - Project Chairman

SUMMARY -

Eighty-eight reports are arranged in alphabetical order by crop and author. Papers listing multiple crops or no crops at all are included at the end.

Alfalfa - Ten of seventeen dormant treatments and one of four early post-emergence treatments provided 100% control of downy brome in Wyoming. Seven months following treatment, terbacil, pronamide, and metribuzin gave 100% control of both downy brome and field pepperweed. Pronamide continued to give 90% and better control of downy brome for up to two years following treatment. Newly seeded alfalfa stands were reduced by EPTC and EPTC/Extender at 4 lb ai/A. Pendimethalin, EPTC, and profluralin alone and in combination gave maximum control of redroot pigweed and green foxtail in newly seeded alfalfa. Established stands of alfalfa were tolerant to fall applications of terbutryn but succulent spring growth was killed by early spring applications in New Mexico. Late fall applications of 2,4-DB, diuron, metribuzin, and terbacil gave excellent control of winter mustards. In Idaho, combinations of six herbicides gave 85 - 100% control of barnyardgrass and five broadleaf weeds in seed alfalfa. EPTC applied as a seed or preplant incorporated treatment caused stunting and sticking of alfalfa leaves in California. Bromoxynil effectiveness was not reduced by sprinkler irrigation immediately after application. RO 138895 provided excellant selective postemergence control of wild oats in seedling alfalfa. Chlorpropham and DCPA gave season-long dodder control in Utah.

Barley - Diclofop and diclofop/DPX 4189 allowed 80 - 98% control of wild oats but complementary treatments were apparently essential to obtain consistent control. DPX 4189 and DOWCO 290 each showed promise as control agents for Canada thistle in spring barley. A non-ionic surfactant significantly improved the herbicidal activity of DPX 4189 on perennial sowthistle. Soil moisture enhanced wild oat control with diclofop. Bromoxynil applied through a center-pivot was more effective on Russian thistle than redroot pigweed.

Beans - Trifluralin, pendimethalin, ethalfluralin, and metolachlor provided 100% control of wild buckwheat. Nine herbicide treatments gave 100% control of all weeds with no reduction in stand.

Field Corn - Vernolate/(R 25788) provided more consistent and higher percentage weed control into the late season than EPTC/(R 25788) or butylate/ (R 25788). Of six herbicides tested against redroot pigweed and field sandbur, only one, atrazine, controlled both weeds, including field sandbur. Cyanazine combined with either alachlor, metolachlor, PPG 225, or PPG 844 exhibited excellent control of barnyardgrass, redroot pigweed, and hairy nightshade. Corn was almost completely killed by all rates of DPX 4189.

Cotton - High rates of fluridone provided greater yields than those from hoed and treated checks and lower rates of the same herbicide. Maturing cotton may tolerate over-the-top applications of glyphosate of 1.5 lb ae/A or less without yield reduction.

Guayule - DCPA caused no reduction and pendimethalin caused 20% reduction in stand on 12 cultivars of direct-seeded guayule.

Gumweed - Maximum dry weight of gumweed was obtained when plant spacing was six inches apart.

Oats - A possible explanation for loss of EPTC soil persistence might have been related to an increased population of degrading microorganisms.

Pasture - Pronamide, metribuzin, terbacil, and hexazinone provided good control of foxtail barley in grass stands of western Wyoming.

Peas - Dinoseb, metribuzin, and triallate combinations gave 100% control of all weed species present. Metribuzin gave good broadleaf control when soil incorporated.

Peppermint - Combinations of napropamide, terbacil, and oryzalin gave good broad-spectrum weed control in peppermint. Oil yields were greater when peppermint was treated with 2 lb/A of asulam than in untreated controls. Common groundsel was controlled with bromoxynil. BAS 9025 OH and RO 138895 gave equal control of Kentucky bluegrass.

Rape - Winter rape appeared to be tolerant to ten herbicides applied in Idaho. Diclofop, dalapon, barban, and asulam controlled wild oats. A combination of napropamide and nitrofen gave good control of all weed species except fiddleneck, but caused some reduction in stand.

Safflower - Seven of nine herbicides caused minor or no crop vigor reduction.

Sorghum - A safener was successful in reducing phytotoxicity by metolachlor, alachlor, and MON 097.

Soybeans - Commercially acceptable control of groundcherry was obtained with seven herbicides and fifteen herbicides controlled barnyardgrass.

Sugarbeets - A Nortron/Pyramin combination at 2 and 3 lb ai/A respectively showed good weed control in Idaho; however, yield was depressed. Statistical differences in yield appeared to be related to herbicide efficacy and dose. All rates of BAS 9052 and lower rates of RO 138895 appeared well tolerated in Idaho and provided excellent selective postemergence barnyardgrass control in California. BAS 9052 OH also gave good grass control. A combination of BAS 9052, ethofumesate, and desmedipham warrents further evaluation. RO 139985 alone and in combination controlled green and yellow foxtail effectively. Excellent broad-species weed control was obtained from eight combinations.

Sunflower - Metolachlor alone and in combination with chloramben provided 88 - 100% control of prostrate pigweed, and an oryzalin/chloramben treatment controlled redroot pigweed and wild buckwheat. Ethalfluralin, preplant incorporated, provided 100% control of the weed spectrum. Similar rates in Idaho and Wyoming did not show sunflower phytotoxicity.

Wheat - Propham/metribuzin and propham/atrazine combinations exhibited acceptable control of grass and broadleaf weeds on fallow land. Combinations of five herbicides were sufficiently persistent to give satisfactory overwinter control of volunteer wheat and jointed goatgrass at one Colorado site but were disappointing at another. EL-187 at rates greater than 0.4 lb ai/A and RE-28269/atrazine combinations provided excellent control of volunteer wheat and Russian thistle in Wyoming. Atrazine, metribuzin, and glyphosate combinations gave similar control when applied in summer. Best stands and highest yields resulting from fall applied chemical fallow treatments occurred where weed control during the summerfallow period was greatest. Fall tillage and fall chemical fallow in Oregon using cyanazine/atrazine applications increased yield of winter wheat. Broad spectrum weed control in chemical fallow can be achieved by the use of propham, diuron, terbutryn, and 2,4-D combinations. Propham was just as effective on volunteer wheat and downy brome when applied on snow cover as when applied on bare soil and exposed foliage.

Incorporation of three thiocarbamate herbicides was delayed up to 12 hours without loss of effectiveness. Eleven herbicides gave 92 - 100% control of common lambsquarters and redroot pigweed in Wyoming spring wheat. Practical application rates of DPX 4189 in Oregon winter wheat were 0.02 lb ai/A or less. DPX 4189 provided equal or better weed control than either bromoxynil or 2,4-D in California but persisted in soil sufficiently to injure crops sowed after wheat harvest. Diclofop applied at 1 lb ai/A averaged over 94% control of downy brome and metribuzin gave excellent control of ivyleaf speedwell in Oregon. Terbutryn tended to reduce yields of winter wheat. Seven post applied applications provided yields greater than the check in Idaho. Ripgut brome was controlled by diclofop at 1.4 kg ai/ha.

Multi-crop - The persistence of DPX 4189 in alfalfa and sugarbeets was measured in a soil bioassay. Asulam at 1.0 lb ai/A provided 99% control of yellow foxtail in alfalfa and showed limited uptake and translocation in both alfalfa and sugarcane. Pendimethalin did not affect overall yields of wheat or barley.

Non-crop - Immediate incorporation of thiocarbamate herbicides may not be as important as currently thought. Studies with two rotary atomizer applicators since 1977 have shown widespread usage potential in California.

Alfalfa yield and percentage weed control resulting from dormant and early postemergence treatments. Alley, H. P., G. L. Costel and N. E. Humburg. Several individual and combination herbicides were applied as dormant treatments on April 11, 1980, and as early postemergence on April 24, 1980, to evaluate their effectiveness toward annual broadleaf and grassy weeds. At the dormant application date the downy brome had 1 leaf/0.25 to 1 in growth with a minor infestation of kochia, with tansy mustard and dandelion in the rosette stage of growth. The early postemergence treatments were applied when the alfalfa was 2 to 3 in high; downy brome 3 to 4 leaf/1 to 1.5 in high; kochia 0.5 to 1 in high and dandelion 2 to 3 in rosette. All herbicides were applied with a 6-nozzle knapsack unit in a total volume of 40 gpa water carrier. Plots were 9 by 30 ft, arranged in a randomized complete block, with three replications.

Percentage weed control and alfalfa stand was determined by hand clipping each plot, separating the weeds from the alfalfa, weighing (green weight) and computing stand and percentage weed control by comparing to weights from the untreated check plots. Ten of the seventeen dormant treatments resulted in 100% control of downy brome whereas only one early postemergence treatment, Ro 13-8895, gave 100% control of the downy brome. No annual broadleaf weeds were separated from the alfalfa. Green alfalfa yield was less than the check from only two treatments which was the result of poor weed control rather than phototoxicity of the herbicides. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1069).

Alfalfa yield and downy brome control

Herbicide[1]	Rate lb ai/A	Yield lb/A[2] Alfalfa	Downy brome	Percent Control
Dormant				
pendimethalin 4EC	1.0	4620	440	0
pendimethalin/metribuzin 4L	1.0 + 0.5	4580	0	100
metolachlor 8E	1.5	3760	160	53
metolachlor 8E	2.0	2840	420	0
metolachlor 8E	2.5	3720	380	0
metribuzin 75DF	0.5	4660	0	100
metribuzin 75DF	0.75	5340	0	100
metribuzin 4F	0.75	4900	0	100
metribuzin 4F	1.0	4260	0	100
hexazinone 2L	0.5	5540	0	100
hexazinone/terbacil	0.5 + 0.5	5360	0	100
hexazinone/metribuzin 75DF	0.5 + 0.5	4800	0	100
terbacil 80W	0.5	3940	0	100
terbacil 80W	1.0	5060	0	100
pronamide 50W	1.0	4160	60	80
bromoxynil 2E	1.0	3960	440	0
bromoxynil 2E	0.5	4200	380	0
Early Postemergence				
bromoxynil 2E	0.5	3980	300	0
2,4-DB amine	1.0	3460	220	27
Ro 13-8895 + X-77	0.25	3940	0	100
Ro 13-8895 + X-77	0.5	4240	0	100
Check	---	3560	300	0

[1]Dormant treatments applied April 11, early postemergence April 24, 1980.
[2]Plots harvested and separations made June 24, 1980. Weights reported in green weight.

Annual grass and broadleaf weed control resulting from fall treatments in dryland alfalfa. Alley, H. P., N. E. Humburg and G. L. Costel. Treatments were applied to semi-dormant dryland alfalfa on November 7, 1979. The alfalfa had been frosted but was green at the base of the plant. Downy brome had germinated with 0.5 inch leaf height and tumble mustard was in the cotyledon stage of growth due to recent moisture. Air temperature was 45 F with relative humidity of 85% at time of treatment. The soil was classified as a sandy loam (56.6% sand, 26.2% silt, and 17.2% clay) with 2.8% organic matter with a pH of 7.3. All treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 40 gpa solution at 40 psi pressure. Plots were 9 by 25 ft, arranged in a randomized complete block, with three replications.

Visual weed control evaluations were made June 24, 1980, approximately 7 months following treatment. Terbacil at 0.75 lb ai/A, pronamide at 1.5 lb ai/A and metribuzin at 0.75 lb ai/A gave 100% control of the downy brome and field pepperweed. Bifenox gave no control of either weed species at the rates applied. (Wyoming Agric. Exp. Sta., Laramie, 82071, SR 1070).

Downy brome and field pepperweed control

Herbicide[1]	Rate lb ai/A	Percent Control[2]	
		Downy brome	Field pepperweed
bifenox 4F	1.0	0	0
bifenox 4F	2.0	0	0
bifenox 4F	3.0	0	0
bifenox 4F	4.0	0	0
terbacil 80W	0.75	100	100
pronamide 50W	1.5	100	100
metribuzin 4F	0.75	100	100

[1]Herbicides applied November 7, 1979.
[2]Visual evaluations June 24, 1980.

Annual weed control in dormant, dryland alfalfa one and two years following treatment. Alley, H. P., N. E. Humburg and G. L. Costel. Individual herbicides and/or combinations were applied April 6, 1978 to evaluate their effectiveness for control of downy brome and field pepperweed in established, dormant, dryland alfalfa. The alfalfa was breaking dormancy with the first trifoliate leaves beginning to form at time of treatment. The downy brome was in the 1-leaf stage with 0 to 2 tillers and field pepperweed had not emerged. All herbicides were applied with a 6-nozzle knapsack unit in a total of 40 gpa water carrier. Plots were 9 by 25 ft, arranged in a randomized complete block, with three replications. Air temperature was 56 F with a 39% relative humidity and soil temperatures were 74, 56, 48 and 47 F at the surface, 1, 2 and 4 inch depths, respectively. The soil was a clay loam (51.2% sand, 26.4% silt, and 22.4% clay) with 2.4% organic matter and a pH of 6.5.

Percentage weed control and alfalfa stand were determined by visual evaluations on June 13, 1978, June 15, 1979 and June 24, 1980, approximately 2, 14 and 26 months following treatment. The experimental plot area was under considerable drought stress during the 1979 growing season.

Six individual herbicides and/or combinations gave 90% or greater control of downy brome one year following treatment. Five treatments were maintaining 90% or greater downy brome control after two years. Those treatments were: oxyfluorfen/pronamide at 0.375 + 0.5 and 0.5 + 0.5 lb ai/A, acifluorfen/pronamide at 0.5 + 0.5 lb ai/A and pronamide at 0.75 and 1.0 lb ai/A. Pronamide appeared to be the herbicide possessing the residual resulting in longevity of control. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1068).

Weed control and alfalfa stand

Herbicide[1]	Rate lb ai/A	Alfalfa Stand			Weed Control[2]				
					DB			FP	
		1978	1979	1980	1978	1979	1980	1978	1979
propham	3.0	93	100	100	53	40	0	12	0
oxyfluorfen/WA	0.5	100	100	100	23	8	0	93	50
oxyfluorfen/WA	1.0	97	100	100	93	47	80	100	93
oxyfluorfen/pronamide/WA[3]	0.25 + 0.5	100	100	100	77	93	80	68	42
oxyfluorfen/pronamide/WA	0.375 + 0.5	100	100	100	92	96	90	100	98
oxyfluorfen/pronamide/WA	0.5 + 0.5	100	100	100	100	97	100	100	100
oxyfluorfen/pronamide/WA	0.25 + 0.25	97	100	100	63	80	80	97	50
oxyfluorfen/paraquat/WA	0.25 + 0.25	100	100	100	88	38	70	98	75
paraquat/WA	0.5	100	100	100	95	50	60	100	80
acifluorfen/pronamide/WA	0.5 + 0.5	100	100	100	65	95	90	100	96
pronamide	0.75	100	100	100	63	99	90	20	8
pronamide	1.0	100	100	100	27	96	90	30	0
metribuzin (50W)	0.5	100	100	100	67	25	20	100	92
metribuzin (50W)	0.75	100	100	100	97	33	20	100	90
metribuzin (4F)	0.5	97	100	100	67	42	20	99	93
metribuzin (4F)	0.75	100	100	100	87	50	20	100	87
metribuzin (4L)	0.5	100	100	100	83	50	20	100	63
metribuzin (4L)	0.75	100	100	100	98	50	30	100	85
hexazinone (DF)	0.5	100	100	100	80	30	20	100	95
hexazinone (SP)/metribuzin (80W)	0.5 + 0.5	100	100	100	100	33	20	100	93
hexazinone (SP)/metribuzin (4L)	0.5 + 0.5	100	100	100	97	25	10	100	55
terbacil (80W)	0.5	100	100	100	85	55	20	100	78
terbacil (80W)	1.0	100	100	100	97	33	25	100	95

[1]Herbicides applied April 6, 1978.
[2]Visual evaluations June 13, 1978, June 15, 1979 and June 24, 1980.
Abbreviations: DB = downy brome; FP = field pepperweed.
[3]Triton AG-98 added at ½% v/v.

Evaluation of preplant, preemergence, preplant/postemergence and postemergence herbicide treatments for weed control in newly seeded alfalfa. Alley, H. P., N. E. Humburg and D. F. Ernst. Plots were established at the Torrington Research and Extension Center to evaluate the effectiveness of various herbicides and/or combinations for annual weed control in newly seeded alfalfa (variety Thor). All herbicides were applied broadcast, full coverage, on 9 by 24 ft plots which were arranged in a randomized complete block with 3 replications. Treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 40 gpa solution. The preplant treatments were applied May 20, 1980, and incorporated immediately with IHC S-tine harrow w/finger tines. Preemergence treatments were made May 23 and postemergence applications June 20, 1980. The alfalfa and weed growth at time of postemergence treatments were: alfalfa: cotyledon to 7 trifoliate leaves/ 0.5 to 6 in leaf growth; hairy nightshade: 2 leaf to 6 lateral branches; kochia: to 15 in diameter; redroot pigweed: to 4 lateral branches/10 in diameter; common lambsquarters: 8 leaf to 4 lateral branches; barnyardgrass: 6 leaf/3 to 8 in; green foxtail: 5 leaf/2 to 5 in.

Weed control and alfalfa stand evaluations were made visually on June 27, 1980. Alfalfa stands were reduced by EPTC and EPTC/Extender at the 4.0 lb ai/A rate. Postemergence applications of Ro 13-8895 did not affect the alfalfa stand. Competition from weeds markedly reduced the alfalfa stands in untreated plots. Weed stands were irregular at evaluation. Pendimethalin/EPTC provided good weed control of all weed species recorded. EPTC/Extender was more effective than EPTC, at equivalent rates, for control of grasses. Ro 13-8895, which is not effective on broadleaf weeds, was twice as active when applied postemergence than when applied preemergence. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1067).

Alfalfa stand and weed control

Herbicides[1]	Rate lb ai/A	Alfalfa[2] Stand %	Percent Weed Control[3]			
			LQ	PW	NS	GR
PPI						
pendimethalin	1.0	62	96	89	33	78
pendimethalin/EPTC	1.0 + 2.0	72	100	99	89	88
EPTC	3.0	70	93	96	80	63
EPTC	4.0	50	97	89	83	65
EPTC/Extender	3.0	62	97	87	93	92
EPTC/Extender	4.0	48	99	93	95	93
profluralin	0.75	72	63	59	23	82
profluralin + EPTC	0.5 + 2.0	65	97	90	80	83
PPI + Postemergence						
profluralin/Ro 13-8895 + X-77	0.5 + 0.5	83	47	73	30	77
Preemergence						
Ro 13-8895	0.5	72	0	0	0	43
Ro 13-8895	1.0	85	0	0	0	73
Postemergence						
Ro 13-8895 + X-77 0.5% $^{v}/v$	0.2	75	0	0	0	70
Ro 13-8895 + X-77 0.5% $^{v}/v$	0.5	74	0	0	0	70
Check		40	0	0	0	0
plants/sq ft (visual estimate)		*10*	*1*	*1*	*2*	*2*

[1]Herbicides applied preplant May 20, preemergence May 23 and postemergence June 20, 1980.
[2]Alfalfa stand visual evaluation June 27, 1980, as percent of best plot.
[3]Weed control, visual evaluation June 27, 1980. Abbreviations: LQ = common lambsquarters; PW = redroot pigweed; NS = hairy nightshade; GR = barnyardgrass, green foxtail, witchgrass and stinkgrass.

Evaluation of preplant incorporated herbicides for weed control in newly seeded alfalfa. Alley, H. P., N. E. Humburg and G. D. Jackson. Plots were established at the Powell Research and Extension Center to evaluate the effectiveness of various herbicides and/or combinations for annual weed control in newly seeded alfalfa (variety Marathon). The preplant herbicides were broadcast, full coverage, on 9 by 20 ft plots May 7, 1980, with a 6-nozzle knapsack unit calibrated to deliver 40 gpa solution. The herbicides were incorporated immediately with a roller harrow. Alfalfa was seeded the following day. Air temperature at time of treatment was 72 F, the relative humidity 28%, and the soil temperature 112, 98, 88 and 67 F at the surface, 1, 2 and 4 inch depths. Treatments were replicated 3 times in a randomized complete block. The soil was a loam (41.4% sand, 39.0% silt, and 19.6% clay) and 1.6% organic matter with a 7.9 pH. Plots were flood irrigated for crop emergence and as needed throughout the year.

Weed control and crop response was determined by visual estimates on July 2, 1980. No herbicide treatment caused injury to alfalfa plants; however, alfalfa stand was irregular. Kochia and common lambsquarters showed chemical injury and wild mustard was stunted by EPTC. All treatments gave 100% control of redroot pigweed and green foxtail. Wild mustard was the predominant weed which pendimethalin, EPTC and pendimethalin/EPTC provided partial control. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1066).

Weed control - newly seeded alfalfa

Herbicide[1]	Rate lb ai/A	Percent Weed Control[2] PW	KO	LQ	WM	GF
pendimethalin	1.0	100	100	100	77	100
pendimethalin/EPTC	1.0 + 2.0	100	100	100	87	100
EPTC	3.0	100	97	80	73	100
EPTC	4.0	100	77	82	67	100
EPTC/Extender	3.0	100	85	90	87	100
EPTC/Extender	4.0	100	92	88	75	100
profluralin	0.5	100	97	90	0	100
profluralin	0.75	100	95	95	23	100
profluralin + EPTC	0.5 + 2.0	100	98	100	27	100
plants/sq ft (visual estimate)		*0.3*	*0.2*	*0.2*	*1.0*	*0.1*

[1]Herbicides applied and incorporated May 7, 1980.
[2]Visual estimates July 2, 1980. Abbreviations: PW = redroot pigweed; KO = kochia; LQ = common lambsquarters; WM = wild mustard; GF = green foxtail.

Terbutryn applied in established alfalfa for winter annual weed control. Anderson, W. Powell and Gary Hoxworth. Terbutryn was applied in a stand of established alfalfa (var. Mesilla) located at Arrey, New Mexico, at dosages of 0.75, 1.0, 1.5, and 2.0 lb ai/A on November 16, 1979, for the control of London rocket and flixweed. The treatments were applied broadcast to their respective 12 ft x 35 ft plots in one-half gallon of water (52 gal/A) using a bicycle-type plot sprayer. At time of treatment, the alfalfa had not been exposed to a killing frost and there were new shoots on the plants 1 to 2 inches long. Small London rocket plants were scattered in the plot areas, but flixweed seedlings had not yet emerged. Each treatment was replicated 4 times, and the treatments randomized. Visual evaluations made in February 1980, revealed 100 percent control of London rocket and no adverse effects to flixweed or alfalfa.

In an effort to control the actively growing flixweed plants, it was decided to reapply terbutryn as a postemergence treatment to the flixweed and the now actively growing alfalfa, but to make the second application to only two of the four replications. On February 29, 1980, the same dosages of terbutryn as applied in November were reapplied to their respective plots in two of the replications. At the time of this application, the alfalfa was actively growing, with new shoots about 4 inches long, and the flixweed plants were about 4 inches tall. Results of these postemergence treatments on the alfalfa was almost immediately apparent, with the succulent shoots wilting and turning greyish in color. Eventually, these shoots died back to the plant crowns. In time, new shoots developed from the crowns and the alfalfa had partially recovered from the terbutryn injury by time of first-cut. The flixweed plants were unaffected by the postemergence applications of terbutryn at any of the four dosages.

First-cut yield data were obtained for the alfalfa treated with terbutryn, and the data is recorded in the table along with yields from untreated control plots. To obtain the yield data, a center swath 3 ft wide by 29 ft long was cut in each plot May 12, the vegetation allowed to dry overnight, and then raked up and weighed May 13.

In summary, it appears that established stands of alfalfa are tolerant to terbutryn applied in the fall of the year, even when the alfalfa has not yet become dormant, but succulent new growth of alfalfa is killed back to the alfalfa crowns by late winter/early spring applications of terbutryn to actively growing alfalfa. London rocket is very susceptible to terbutryn and this weed is effectively controlled by fall applications of this herbicide at a dosage as low as 0.75 lb ai/A. Flixweed appears to be completely tolerate to terbutryn, as a dosage as high as 2.0 lb ai/A failed to control flixweed when applied either preemergence or postemergence to this weed. (Agr. Expt. Sta., New Mexico State University, Las Cruces, N. M. 88001.)

Alfalfa yields from established stands treated with terbutryn for winter annual weed control.

Treatment		Yields (lb/plot)			Yield
		Replication			
Herbicide	lb ai/A	1	2	Av.	lb/A
Applied November 16, 1979.					
terbutryn	0.75	17.8	20.1	19.0	9,513
	1.00	23.8	21.7	22.8	11,416
	1.50	20.0	25.2	22.6	11,316
	2.00	19.2	19.5	19.4	9,714
Applied November 16, 1979, and February 29, 1980.					
terbutryn	0.75	13.8	12.1	13.0	6,509
	1.00	14.6	9.4	12.0	6,008
	1.50	10.6	9.3	10.0	5,007
	2.00	7.9	6.5	7.2	3,605
Untreated	--	20.2	23.5		
		24.0	21.8	22.8	11,416

Yields from established alfalfa treated in November with herbicides for winter mustard control. Anderson, W. Powell and Gary Hoxworth. To investigate failures by alfalfa growers to effectively control London rocket, flixweed, and tansy mustard (winter annual weeds called "winter mustards" by the growers), research was carried out during 1978 and 1978-79 with five herbicides labeled for this use. The herbicides were 2,4-DB ester, dinoseb (acid form), diuron, metribuzin, and terbacil. Each herbicide was applied at two or three dosages. Results of this research indicated that, with the exception of dinoseb, 95 percent or better control of these winter weeds could be obtained with the lowest, as well as higher, dosage of any one of these herbicides applied after the last cut in November to mid-December. If dinoseb was used, a November/December treatment followed by a late February/March treatment resulted in 95 percent or better weed control. None of the treatments appeared to reduce alfalfa yields. However, yield data obtained varied widely (and wildly) due to the plots being located in an erratic stand of alfalfa, but where the weed infestation was severe. Results of this earlier research was included in the 1979 Res. Prog. Rept. of the Western Weed Sci. Soc.

To obtain reliable yield data applicable to the above research, the same herbicides and dosages were applied November 16, 1979, in a uniform stand of alfalfa (var. Mesilla) located on the same farm as was the previous research. There were few weeds in the experimental area during the period of this research. The treatments were applied to their respective 12 ft x 35 ft plot in one-half gallon of water (52 gal/A) as a broadcast spray using a bicycle-type plot sprayer. At time of treatment, the general area had not received a killing frost and the alfalfa had new shoots 1- to 2-inches in length.

On May 12, 1980, the outer three feet of alfalfa at the ends of each plot was cut and discarded. A three-foot swath was then cut lengthwise through the middle of each plot, making the harvested area 3 ft x 29 ft. This cut alfalfa was allowed to dry over-night, and it was raked up and weighed May 13. The yield data obtained from each of the four replications of each treatment is recorded in the table, along with the average of the four replications and the calculated lb/A. When the yield data was analyzed statistically, it was found that none of the yields differed among herbicides or dosages with one another or with the untreated controls at the 1 percent level of statistical significance, with the exception of the 1.0 lb ai/A dosage of metribuzin. Metribuzin at 1.0 lb ai/A showed a yield reduction that was statistically significantly lower than the other treatments at the 1 percent level but not at the 5 percent level.

In summary, it would appear that November/December applications of 2,4-DB, diuron, metribuzin, or terbacil at their recommended label dosages will provide excellent control of London rocket, flixweed, and tansy mustard (the winter mustards) without reduction of alfalfa yields, with exception of the 1.0 lb ai/A dosage of metribuzin. Dinoseb can be included among these herbicides but a November/December treatment followed by a late February/March treatment would appear necessary. (Agr. Expt. Sta. and Agronomy Dept., New Mexico State University, Las Cruces, N. M. 88001.)

Alfalfa yields from established alfalfa stand treated with herbicides for winter mustard control November 16, 1979 and harvested May 12/13, 1980. Location: Arrey, New Mexico.

Treatment		Alfalfa yields (lb/plot)[a]					
		Replications					
Herbicide	lb ai/A	1	2	3	4	Av.	lb/A
2,4-DB ester	0.75	21.7	18.1	18.7	25.0	20.9	10,465
	1.00	18.0	23.7	21.0	24.1	21.7	10,865
dinoseb	1.25	23.7	20.6	23.6	22.9	22.7	11,366
(acid form)	1.88	20.9	21.2	19.4	22.1	20.9	10,465
diuron	1.20	22.2	17.3	21.1	23.2	20.9	10,465
	1.60	18.2	17.8	17.9	21.1	18.8	9,413
	2.4	21.7	16.9	21.9	22.8	20.8	10,415
metribuzin	0.50	20.3	21.8	16.4	19.1	19.4	9,714
	0.75	22.5	19.3	21.2	21.0	21.0	10,515
	1.00	16.8	16.8	15.4	17.8	16.7	8,362
terbacil	0.40	21.2	22.3	23.0	22.6	22.3	11,166
	0.80	21.3	22.0	22.9	23.2	22.4	11,216
	1.20	24.6	23.9	14.1	21.4	21.0	10,515
Untreated	0	20.2	21.0	24.0	25.1		
		24.0	22.3	19.3	23.5		
		24.0	23.8	21.8	24.5	22.8[b]	11,416

[a]Harvested plot size: 3 ft x 22 ft. Alfalfa cut May 22 and raked up and weighed May 23.

[b]Extra untreated control plots were included to better sample the field for weeds and alfalfa stand, as the experimental area overall was relatively large. The number 22.8 represents the average of the twelve untreated control plots. Few weeds were present in the experimental area, and the few weeds that were present were not separated from the total vegetation harvested from the untreated control plots. Plots treated with any of the herbicides at even the lowest dosage were weed-free at time of harvest.

Evaluations of fall and spring applied herbicides for weed control in seed alfalfa. Brenchley, R. G. and D. L. Zamora. A field study was conducted near Parma, Idaho to evaluate and compare surface applied herbicides for controlling weeds in seed alfalfa. Alfalfa (variety: Weevil Check) was seeded in 1972 in 30 inch rows. Crop was furrow irrigated through corrugates spaced 30 inches apart. During the early part of November 1979 the field was disced twice and recorrugated prior to the fall application of test treatments.

Herbicide applications were made November 15, 1979 (preemergence) and March 7, 1980 (post + preemergence). Environmental conditions at time of application were as follows: (November 15, 1979, air temperature 50 F, soil temperature 38 F, relative humidity 60%, wind NE 2 mph, cloud cover 10%, soil surface was dry to 0.5 inches), (March 7, 1980, air temperature 52 F, soil temperature 37 F, relative humidity 62%, wind 0 mph, cloud cover 90%, soil surface moist to field capacity). Soil type was a silty clay loam, 1.2% organic matter, with a pH of 7.8. Plot size was 12 by 40 feet. Treatments were replicated four times in a randomized complete block design. Herbicide applications were made using a compressed air, one-wheel, push-type sprayer equipped with a seven nozzle (8004) spray boom utilizing 22 psi pressure with a delivery rate of 27 gpa total spray volume.

Rainfall amounts were as follows: November .83 inches, December 1.57 inches, January 1.78 inches, February 1.58 inches, March 1.51 inches, April .55 inches, May 2.04 inches, June .82 inches, July .11 inches.

Weed species present at time of evaluation on July 15, 1980 were flixweed, prickly lettuce, common sowthistle, kochia, common lambsquarters, and barnyardgrass.

Those treatments with acceptable crop tolerance which gave 85-100% control of flixweed, prickly lettuce, common sowthistle, common lambsquarters, kochia and barnyardgrass were paraquat + metribuzin, napropamide + metribuzin, oxyfluorfen + oryzalin, napropamide + terbacil, oxyfluorfen + napropamide, and napropamide 4.0 lb/A. Metribuzin at 1.0 lb ai/A gave excellent broad-spectrum control of the weed species present in this trial; however, this rate appears to be somewhat marginal as far as crop tolerance was concerned. Metribuzin 75DF (Lexone) was slightly more injurious to the alfalfa crop than the metribuzin 4L (Sencor) formulation. Fall applications of metribuzin gave more alfalfa injury than spring applied metribuzin. (SW Idaho Research and Extension Center, University of Idaho 83660)

Evaluations of spring and fall applied herbicides on seed alfalfa 1980

Treatments[1/]	Rate[2/] lb/A	Alfalfa % Stand	Alfalfa % Stunt	Percent Weed Control[3/] FW	PL	AST	CLQ	KO	BYG
Preemergence (Fall 1979)									
Metribuzin 4L	0.75	100	8	92	92	85	93	91	75
Metribuzin 4L	1.0	95	16	99	100	97	98	95	93
Metribuzin 75DF	0.75	95	15	93	99	97	98	100	75
Metribuzin 75DF	1.0	93	20	98	100	95	100	100	89
Diuron	2.0	100	0	96	98	82	91	100	83
Simazine	1.2	100	6	98	98	92	97	85	78
Terbacil	1.0	100	5	100	99	89	75	77	81
PPG-225	1.0	98	8	100	91	91	91	80	62
Oryzalin	1.25	100	0	84	0	25	89	95	95
Oryzalin + Trifluralin	0.75+0.75	100	0	68	57	15	81	97	93
Pronamide	1.0	100	0	97	30	15	85	96	87
Pronamide	2.0	100	0	98	78	40	99	100	95
Pronamide + Metribuzin	0.75+0.5	100	0	99	95	79	93	94	67
Pronamide + Metribuzin	1.0+0.75	100	4	99	100	97	100	100	78
Napropamide	3.0	100	0	74	88	83	83	90	85
Napropamide	4.0	100	0	92	86	87	85	90	98
Napropamide + Metribuzin	2.0+0.5	100	3	98	96	92	97	95	95
Napropamide + Terbacil	2.0+0.75	100	0	100	100	98	97	100	83
Oxyfluorfen	0.5	100	0	100	91	81	89	75	70
Oxyfluorfen	1.0	100	0	100	100	96	99	81	85
Oxyfluorfen + Napropamide	0.75+2.0	100	0	100	100	95	98	84	87
Oxyfluorfen + Oryzalin	0.75+1.0	100	0	98	100	91	91	100	92
Post Emergence (Spring 1980)									
Paraquat CL	0.38	100	0	97	94	80	71	32	0
Metribuzin 4L	0.75	100	0	98	99	98	97	94	73
Paraquat + Metribuzin	0.38+0.75	100	0	100	100	99	100	100	90
Weedy Check		100	0	0	0	0	0	0	0

1/ Metribuzin or Metribuzin 4L=Sencor, Metribuzin 75DF=Lexone
Paraquat CL applied with Ortho X-77 at 8 oz/100 gal.

2/ Rate expressed as lb ai/A

3/ FW=flixweed, PL=prickly lettuce, AST=annual sow thistle, CLQ=common lambsquarters, KO=kochia, BYG=barnyardgrass

<u>EPTC alfalfa seed treatment trials</u>. Cudney, D. W., C. E. Bell, L. S. Jordan, H. Walden, R. Russell and J. Kastler. Two trials were established to evaluate the effects of using EPTC as a seed treatment in alfalfa in comparison to preplant-incorporated treatments of EPTC. Two depths of seeding were used: a deep-seeded treatment where the alfalfa was seeded at ½ inch below the soil surface, and a standard surface-seeded treatment. All alfalfa plots were planted at a rate equivalent to 20 pounds of alfalfa seed per acre. Plots were located at the University of California Riverside experiment farm and the University of California Imperial Valley Field Station. Four replications were made of each treatment. Plot design was a randomized complete block. Alfalfa seed treatments were made at 15% EPTC seed coating and 30% EPTC seed coating. The 15% seed treatment was used for the 3 pounds ai/A EPTC plots, and the 30% EPTC coating was used for the 6 pounds ai/A plots.

EPTC applied as either a seed treatment or preplant-incorporated treatment gave some phytotoxicity in both locations. The symptoms consisted of stunting and sticking together of leaves. The most severe phytotoxicity symptoms were noticed for the 2X 6-pound rate of application applied either as a preplant-incorporated treatment or a seed treatment. The use of 3 pounds of EPTC as a seed treatment appeared to be safe for the surface-seeded alfalfa. At the Riverside location, a reduction in stand and weed control was noticed for the 3-pound deep-seeded treatment. The Riverside location utilized sprinkler irrigation, whereas the Imperial Valley Field Station utilized surface irrigation. This could account for the increased phytotoxicity from the deep-seeded treatment. Also, there was a tendency for reduced weed control with the deep-seeded treatment in the Riverside location, probably due to leaching and germination of weed seedlings from the surface of the leached soil. (University of California Cooperative Extension, Department of Botany and Plant Sciences, University of California, Riverside CA 92521)

EPTC alfalfa seed treatment

	University of California Riverside						IVFS
Treatment	Alfalfa Stand	Alfalfa Plants/ sq ft	Nettleleaf Goosefoot Control	Sowthistle Control	Pigweed spp Control	Pigweed spp/ sq ft	Alfalfa Phyto-toxicity
1. EPTC 3 lbs incorporated, surface seeded	8.8	42.3	10.0	10.0	9.5	.5	2.5
2. EPTC 6 lbs incorporated, surface seeded	7.5	32.5	10.0	10.0	9.8	1.3	4.5
3. EPTC 3 lbs seed treatment, deep seeded	5.8	25.0	8.5	6.5	5.8	13.8	2.5
4. EPTC 6 lbs seed treatment, deep seeded	3.5	27.5	10.0	10.0	9.8	1.3	6.0
5. EPTC 3 lbs seed treatment, surface seeded	8.5	43.8	10.0	10.0	9.5	0	2.5
6. EPTC 6 lbs seed treatment, surface seeded	4.3	21.3	10.0	10.0	10.0	0	4.5
7. No herbicide, surface seeded	10.0	45.0	0	0	0	21.3	2.0
8. No herbicide, deep seeded	9.8	41.3	1.3	2.8	1.3	17.3	1.0

Alfalfa stand counts: 0 = no plants, 10 = 100% stand.

Weed control and phytotoxicity: 0 = no phytotoxicity or weed control, 10 = all plants dead.

All treatments were seeded at 20 lbs per acre.

The effects of irrigation on bromoxynil in alfalfa. Cudney, D. W., L. S. Jordan and R. Russell. Increased effects from bromoxynil have been noted when application was closely followed by irrigation. A trial was established in seedling alfalfa which was at the 4-leaf stage on the University of California Riverside experiment farm. Rates of .25, .50 and .75 lb ai/A of bromoxynil were compared under two regimes. In one regime, application was made and followed immediately by ½ inch of sprinkler irrigation. In the other regime, the plots were not irrigated but left dry. Applications were made using 8003 nozzles, 30 psi and a spray volume of 30 gpa. High populations of pigweed spp. at the 2- to 4-leaf stage were present in the plot areas.

Evaluations were made 1 week after application for alfalfa phytotoxicity and pigweed spp. control. There was no significant difference in alfalfa phytotoxicity whether the plots were sprinkled immediately after application or left dry. Weed control was reduced for the .25 lb rate for the plots which were left dry after application. There were no differences in pigweed spp. control among other treatments. The results of this trial indicate that the effectiveness of bromoxynil was not reduced by sprinkler irrigation immediately after application. (University of California Cooperative Extension and Department of Botany and Plant Sciences, University of California, Riverside, CA 92521)

Phytotoxicity and weed control with bromoxynil

Treatment	Alfalfa Phytotoxicity	Pigweed spp Control
1. .25 lb ai/A bromoxynil + ½" sprinkler irrig.	.8	9.5
2. .50 lb ai/A bromoxynil + ½" sprinkler irrig.	1.5	10.0
3. .75 lb ai/A bromoxynil + ½" sprinkler irrig.	3.0	10.0
4. .25 lb ai/A bromoxynil, dry	.5	7.3
5. .50 lb ai/A bromoxynil, dry	1.8	9.8
6. .75 lb ai/A bromoxynil, dry	2.3	10.0
7. Untreated check	.3	.8

0 = no control or phytotoxicity, 10 = all plants dead.

A comparison of four herbicides for full-season dodder control in alfalfa seed fields. Evans, J. O. and R. W. Gunnell. Western field dodder (*Cuscuta campestris* L.) is the most common dodder species frequenting alfalfa seed and hay fields of Utah. An important part of the problem is the tendency for some dodder control strategies, including some herbicides, to allow mid-season dodder attachment which significantly slows the growth of alfalfa and limits crop seed production. Late germinating dodder plants are also objectionable since they contaminate the crop seed with weed seed and allow the dodder plant to replenish its seed reserve in the soil.

Several herbicides were applied on 20 April when the crop was breaking dormancy and evaluations were made in May, July, and August. In May, all treatments appeared to provide acceptable dodder control ranging between 95 and 100 percent. In July, only certain herbicides were continuing to provide satisfactory control. Dodder plants appeared in the metribuzin and pronamide plots in July whereas chlorpropham and DCPA were sufficiently active against this weed to prevent its appearance prior to crop harvest. Metribuzin reduced the number of dodder plants per given area, but those that escaped its influence failed to exhibit any deleterious affect on their growth or seed production. We believe dodder is probably less sensitive to this herbicide as compared to other compounds in the trial. The average number of dodder plants per square yard in the untreated plots was 21 plants. (Utah Agricultural Experiment Station, Logan, Utah 84322)

Dodder control in seed alfalfa

Treatment	(kg/ha)	Percent dodder control 5/23	7/3	8/5
metribuzin	0.56	95	66	72
chlorpropham (G)	5.60	100	100	90
chloropropham + PPG-124 (G)	5.60	100	100	100
chlorpropham (EC)	4.48	100	100	95
pronamide	1.68	97	79	65
DCPA	8.40	100	100	100
untreated	-	0	0	0

Treated 20 April, 1980 - plot size, 28 feet x 75 feet.

Postemergence wild oat control in seedling alfalfa. Norris, R. F., R. A. Lardelli, and D. L. Ayres. Many annual grasses can invade alfalfa during stand establishment; wild oats when not controlled can cause reductions in yield and can cause loss of alfalfa stand. Two experimental postemergence grass killers were tested and compared with a standard herbicide for control of wild oats in both fall and spring seeded alfalfa in the lower Sacramento valley of California. Both fields were located on the farm at the University of California at Davis. The alfalfa variety sown in both fields was AS 13-R. The fall-seeded field was sowed on November 7, 1979 and was germinated and grown under rainfall conditions. The spring-seeded field was sowed on February 15, 1980 and was likewise grown under rainfall conditions until after completion of weed control evaluations. The soil type for the fall-seeded field was a silty clay loam and for the spring-seeded field was a silt loam. Both experiments were sprayed using a CO_2 backpack hand-sprayer equipped with 8004 nozzles and calibrated to deliver 40 gal/A of solution. The plot size was 8 ft by 10 ft in both trials, and both were replicated three times and were layed out in a complete block randomized design. BAS-9052 OH and Ro-138895 were applied to the fall-seeded trial on November 30, 1979 at which time the alfalfa had one true leaf and the heavy wild oat population was at the three-leaf growth stage. Propham was applied to this trial on January 2, 1980 when the alfalfa was at the three-leaf growth stage and the wild oats had from 4 to 9 leaves and had commenced tillering. All treatments were applied to the spring-seeded trial at the 2- to 3-leaf stage of alfalfa growth and when the wild oats had from 1 to 3 leaves; application date was March 26, 1980.

Propham applied at 6.0 lb/A in January caused considerable vigor reduction in the alfalfa; this did not occur from the March treating date. The lack of activity at the later treating date was attributed to low rainfall (about 0.7 inches 10 days after application) in comparison with heavy rain (over 4.0 inches in the 14 days following application) following the January treatment. BAS-9052 OH and Ro-138895 did not affect alfalfa vigor or stand, even when applied at the one-leaf growth stage in the fall. A temporary chlorosis was noted for the 2.0 lb/A rate of BAS-9052 OH applied in the fall; but this was rapidly outgrown. Propham provided good wild oat control in the fall-seeded trial, but showed little activity in the spring seeded trial. This latter loss of activity was attributed to the above noted difference in rainfall conditions. Propham also offered partial control of several broadleaved weeds in the fall-seeded trial. BAS-9052 OH and Ro-138895 both provided excellent wild oat control at both planting dates; neither compound showed any activity against broadleaf weeds. (Botany Department, University of California, Davis, CA 95616).

Postemergence wild oat control in seedling alfalfa.

		Fall-seeded 1/		Spring-seeded 2/	
Herbicide	Rate lb/A	Alfalfa vigor	Wild oat control	Alfalfa vigor	Wild oat control
BAS-9052 OH	0.5	9.7	8.0	9.3	9.5
BAS-9052 OH 3/	1.0	10.0	8.7	10.0	10.0
BAS-9052 OH	2.0	9.8	8.8	9.5	9.8
Ro-138895	0.25	9.7	7.7	8.5	8.7
Ro-138895 4/	1.0	9.5	8.7	9.3	9.3
Propham	4.0	8.0	6.7	8.3	0.3
Propham	6.0	5.7	9.0	8.3	1.7
Untreated check	-	5.0	0.0	8.7	0.0

1/ Evaluated 2/27/80. 2/ Evaluated 4/25/80. 3/ Used with 0.25 gal/A of Atplus 555
4/ Used with 0.25% vol/vol ACR 4008.
Vigor: 10 = normal, 0 = dead. Control: 10 = complete kill, 0 = no control.

Wild oat control in dryland barley. Alley, H. P., G. L. Costel and N. E. Humburg. The study was conducted near Sheridan, Wyoming, to evaluate early, late and sequential postemergence herbicide treatments for wild oat control in dryland barley. Plots were 9 by 30 ft with three replications arranged in a randomized complete block. The treatments were applied with a knapsack spray unit equipped with a 6-nozzle boom calibrated to deliver 40 gpa water as a carrier. The early postemergence treatments were applied when the wild oats were in the 1 to 3-leaf stage of growth; late postemergence treatments when the wild oats were in the 3 to 5-leaf stage, with the sequential treatment being made at the respective dates. Visual wild oat control evaluations were made on June 25, 1980. The plots were harvested and wild oat separated from a 4-oz sample from the replication to determine percentage control by contamination of the harvested plots.

Diclofop and diclofop/DPX-4189 were the only treatments resulting in 80 to 98% control.

Both the visual evaluation and wild oat separation gave comparable control readings, especially for the better treatments. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1062).

Wild oat control, barley yield and test weight

Treatment	Rate lb ai/A	Percent Control[3] Visual	Counts	Bu Wgt.	Bu/A	
Early Post[1]						
diclofop	0.75	85	80	46.2	31.5	Barley not injured
diclofop	1.0	95	98	38.8	30.2	" " "
diclofop/DPX-4189 80W	0.75 + 0.062	58	85	47.0	17.2	Barley shortened, thinned
barban	0.38	38	--	--		
triallate 10G	1.25	27	--	43.7	14.8	Barley stand reduced
Late Post[2]						
barban	0.5	58	6	45.5	18.2	
triallate 10G	1.25	20	46	46.5	20.5	Barley shortened
difenzoquat 2AS + X-77[4]	0.75	7	1	38.8	11.5	" " , damaged
difenzoquat 2AS + X-77	1.0	23	0	43.0	11.9	" " "
difenzoquat SF + X-77	1.0	57	59	40.1	15.7	" " "
difenzoquat 2AS/2,4-D ester + X-77	1.0 + 0.5	58	--	41.8	13.3	Barley OK
difenzoquat SF/2,4-D ester + X-77	1.0 + 0.5	40	0	42.3	10.1	Barley shortened, damaged
difenzoquat 2AS/bromoxynil + X-77	1.0 + 0.25	7	--	38.8	14.4	Barley OK
MAA	2.0	10	0	41.6	10.5	" "
MAA	3.0	0	0	42.3	10.7	" "
MAA/difenzoquat 2AS + X-77	2.0 + 0.75	50	40	41.6	11.5	" "
SD 45328	0.15	0	17	--	12.3	
SD 45328	0.18	0	17	43.0	6.8	
SD 45328	0.2	0	44	--	8.9	
SD 45328	0.25	0	0	42.3	7.1	Barley shortened, stand reduced
Sequential						
barban	0.25 + 0.25	0	--	43.0	17.6	
Check		--	--		6.3	

[1]Applied May 7; wild oat 1 to 3 leaf.
[2]Applied May 17; wild oat 3 to 5 leaf.
[3]Visual evaluation June 15; counts by separating wild oat seed from sample.
[4]X-77 added at 0.6 fl oz per gpa in excess of 10 gpa.

Wild oat control in irrigated barley resulting from preplant, postemergence and complementary preplant/postemergence herbicide treatments. Alley, H. P. and N. E. Humburg. With the preplant and postemergence wild oat herbicides available it is difficult to predict the level of control that will result. In previous research, when one has relied upon only preplant herbicides or postemergence herbicides failures have been common place. Where the preplant treatment has been utilized along with a postemergence treatment there have been no failures. These demonstration plots were established in two areas where wild oat is a serious problem to demonstrate what can be accomplished by utilizing those compounds available for wild oat control.

Plots were approximately 2/3 acre in size with all herbicides being applied by a truck mounted spray unit in 25 gpa water. The demonstration was arranged so that there would be individual preplant and postemergence treatments with each postemergence herbicide applied on plots which had previously been treated preplant. Triallate was applied and incorporated before planting. The early postemergence treatments were applied when the wild oat was in the 1 to 2-leaf stage and late postemergence applied when the wild oat was in the 2 to 4-leaf stage of growth. Germination and emergence of wild oat was irregular with many emerging after post treatments.

Both plant counts and visual evaluations were made at Worland and only visual evaluations on the Powell plots to evaluate control. As evidenced in several previous research plots either or both the preplant or postemergence herbicides can fail or be successful, but no failures where both are used in conjunction as complementary treatments. At the late evaluation date, triallate as a preplant treatment gave 85% control at Worland and completely failed on the Powell plots. Diclofop as an early post treatment failed at Worland and gave 85% control at Powell. Where triallate was applied preplant and diclofop or barban, applied as early post treatments, and difenzoquat as a late post treatment control ranged from 70 to 90% at each location. It appears that, to consistently obtain wild oat control, complementary herbicide treatments are essential. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1064).

Wild oat control - 2 locations

Herbicide and Rate lb ai/A			Wild Oat Control[1]	
		POWELL		
Preemergence		Early Postemergence	7/16/80	
triallate 1.25		---	0	
triallate 1.25	+	diclofop 0.75	75	
triallate 1.25	+	barban 0.38	70	
		diclofop 0.75	85	
		barban 0.38	0	
		Late Postemergence		
triallate 1.25	+	difenzoquat 1.0	70	
		difenzoquat 1.0	0	
		barban 0.5	0	
		Early Plus Late Post		
		barban 0.25 + 0.25		
		WORLAND (Early Post)	6/3/80	7/18/80
triallate 1.25	+	---	63	85
triallate 1.25	+	diclofop 0.75	97	90
triallate 1.25	+	barban 0.38	100	90
		diclofop 0.75	21	0
		barban 0.38	73	0
		Late Postemergence		
triallate 1.25	+	difenzoquat 1.0	73	90
		barban 0.5	0	0
		difenzoquat 1.0	17	0
		Sequential		
		POWELL		
		barban 0.25 + 0.25	---	0
		WORLAND		
		barban 0.25 + 0.25	59	0

[1]Visual evaluations Powell July 16, 1980. Visual and quadrate counts at Worland.

Wild oat control in irrigated barley resulting from early, late and sequential herbicide treatments. Alley, H. P., N. E. Humburg and T. K. Schwartz. The study was initiated near Cody, Wyoming, to evaluate early, late and sequential herbicide treatments for wild oat control in irrigated barley. Plots were 9 by 30 ft arranged in a randomized complete block with three replications. The treatments were applied with a knapsack spray unit equipped with a 6-nozzle boom calibrated to deliver 40 gpa water carrier. The soil at the experimental site was classified as a loamy sand (76.4% sand, 19.0% silt and 4.6% clay) with 1.5% organic matter and a pH of 8.1.

The early postemergence treatments were applied May 9, 1980, when the wild oat was 1 to 2-leaf stage. Air temperature was 56 F with 48% relative humidity; soil temperatures were 69, 69, 63 and 57 F at the surface and 1, 2 and 4-inch depths, respectively. There was an irregular crop and wild oat stand. Approximately 1.5 inches of precipitation was received within 24 hours after application. Late post treatments were applied May 22, 1980, at which time the wild oat ranged from 1 to 5-leaf stage. Crop condition was excellent but wild oat emergence was irregular. Air temperature was 79 F with 31% relative humidity. Soil temperatures were 89 F and 78 F, respectively for the 1 and 2-inch soil depths. Sequential treatments correspond with the early and late treatment dates.

Early counts show that diclofop at 1.0 lb ai/A, diclofop + DPX-4189 at 0.75 + 0.062 lb ai/A, difenzoquat 2AS + bromoxynil at 1.0 + 0.25 lb ai/A and MAA at 3.0 lb ai/A giving around 80% wild oat control. Late visual evaluations indicated that diclofop and diclofop + DPX-4189 was maintaining 80% control. However, MAA did not maintain control and SD 45328 at 0.2 and 0.25 lb ai/A was giving 90 and 87% control, respectively. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1063).

Wild oat control - irrigated barley

Treatment	Rate lb ai/A	Percent Control[2] 6/5/80	Percent Control[2] 7/16/80	Injury Rating[3] Wild oat
Early Post[1]				
diclofop	0.75	57	75	4
diclofop	1.0	79	88	4
diclofop + DPX-4189 80WP	0.75 + 0.062	79	82	4
barban	0.38	57	35	4
Late Post				
triallate 10G	1.25	72	45	7
triallate 10G	1.5	72	40	7
difenzoquat 2AS + X-77[4]	0.75	15	3	7
difenzoquat 2AS + X-77	1.0	54	0	7
difenzoquat SF + X-77	1.0	9	20	3
difenzoquat 2AS + 2,4-D ester + X-77	1.0 + 0.5	0	5	5
difenzoquat SF + 2,4-D ester + X-77	1.0 + 0.5	0	30	3
difenzoquat 2AS + bromoxynil + X-77	1.0 + 0.25	85	16	6
MAA	2.0	68	8	3
MAA	3.0	80	23	5
MAA + difenzoquat 2AS + X-77	2.0 + 0.75	52	0	5
SD 45328	0.15	0	38	7
SD 45328	0.18	50	62	7
SD 45328	0.2	57	90	7
SD 45328	0.25	57	87	4
DPX-4189 80WP	0.062	0	57	3
DPX-4189 80WP + difenzoquat 2AS	0.062 + 0.75	0	63	5
DPX-4189 80WP + difenzoquat 2AS	0.062 + 1.0	0	82	5
barban	0.5	0	30	7
Sequential				
barban	0.25 + 0.25	0	30	7

[1]Early post treatments applied May 9, 1980; late post May 22, 1980.
[2]Percent wild oat control: quadrate counts June 6; visual evaluations July 16, 1980.
[3]Injury rating 0 to 10. 0 = no apparent injury, 10 = dead plant.
[4]X-77 added at 0.6 fl oz per gpa in excess of 10 gpa.

Selective control of Canada thistle in spring barley. Alley, H. P., N. E. Humburg and R. E. Vore. Research reports have indicated the potential of new herbicides and/or combinations for selective control of perennial weeds in small grains which have greater activity than the commonly used phenoxy herbicides. This study was initiated to evaluate the effectiveness of three herbicides and/or combinations.

Plots were established July 7, 1980 on a dense stand of Canada thistle infesting barley (var. Klages), underseeded to alfalfa, grown under an overhead sprinkler. The Canada thistle was in the bud-stage of growth and the barley 6 inches tall at time of application. Plots were 9 by 27 ft with three replications arranged in a randomized complete block. All treatments were applied in 40 gpa water carrier. Soil on the experimental site was classified as a loam (42.8% sand, 31.4% silt, 25.8% clay, 1.6% organic matter with a 8.1 pH).

Visual top growth control and crop phytotoxicity ratings were made September 11 and plots harvested September 12, 1980.

Light rates of DPX 4189 prevented seed production with the Canada thistle yellowed. When the rate of application was 0.125 lb ai/A and above the Canada thistle was completely dried up and root activity was prevalent. Dowco 290 (M 3972) at the 0.25 and 0.5 lb ai/A burned down the thistle with complete desiccation. The combination of picloram/2,4-D amine showed excellent activity on the smaller thistle plants with the larger ones still green and succulent at time of evaluation.

Phytotoxicity ratings of 0 to 10, with 0 being no activity and 10 complete burn down, show both the 0.5 lb ai/A DPX 4189 and Dowco 290 (M 3972) giving complete top growth burn down.

The poor stand of barley and damage from hail resulted in low yields which are not indicative of the herbicide phytotoxicity. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1056.)

Canada thistle top growth control-barley yields

Herbicides[1]	Rate lb ai/A	Canada thistle Phyto	Barley bu/A	Observations[2]
DPX 4189 80WP + WA (0.1% v/v)	0.0156	3.0	18.4	Reduced height-no seed production. Yellow. Alfalfa stand reduced 50%
DPX 4189 80WP	0.0156	3.0	9.8	Large thistle green.
DPX 4189 80WP	0.031	5.0	11.8	Flower heads burned off. Yellow. Alfalfa stand reduced 80%
DPX 4189 80WP	0.062	5.3	11.0	Flower heads burned off. Yellow. Alfalfa stand killed.
DPX 4189 80WP	0.125	6.3	9.4	Small thistle dried up. Root activity.
DPX 4189 80WP	0.25	8.7	8.8	Canada thistle dried up. Barley stunted, stand reduced.
DPX 4189	0.5	10.0	10.2	Canada thistle dried up. Barley stunted, stand reduced.
Dowco 290 (M 3972)	0.25	7.7	16.5	Canada thistle completely burned down-dried up. Alfalfa 100% stand reduction.
Dowco 290 (M 3972)	0.5	10.0	15.6	Canada thistle completely burned down-dried up. Alfalfa 100% stand reduction.
picloram/2,4-D amine	0.016 + 0.25	6.0	20.6	Small thistle burned down-large ones succulent-green.
picloram/2,4-D amine	0.023 + 0.375	4.7	19.6	Small thistle burned down-large ones succulent-green.
Check		0	17.0	

[1]Herbicides applied July 7, 1980.
[2]Visual evaluations September 11, 1980.

Using a surfactant for improved thistle control in spring barley. Evans, J. O. and R. W. Gunnell. Excellent control of both Canada thistle (*Cirsium arvense* L.) and perennial sowthistle (*Sonchus arvensis* L.) may be achieved with certain herbicides or tank mixes of herbicides and/or non-ionic surfactants. Our results show that DPX4189 reduced a moderate Canada thistle stand about 95 percent when the chemical was applied at a 40 gm/ha dosage and 98 percent when applied at 160 gm/ha without any additives. The addition of X-77 surfactant at 0.38 percent of carrier volume improved Canada thistle control only slightly or about 1 to 2 percent. The weed control without the additive was sufficiently high so there was little room for improvement. When the same dosages of DPX4189 were employed against perennial sowthistle, however, the addition of the surfactant improved the performance noticeably or from 10 to 14 percent. The surfactant was necessary to realize acceptable perennial sowthistle control with this material. This experiment demonstrated that perennial sowthistle is probably more difficult to control than Canada thistle since traditional herbicides also fail to control perennial sowthistle as thoroughly as Canada thistle at any given dosage. The density of perennial sowthistle was considerably greater than it was for Canada thistle and this might account for some of the differential response noted in this trial. (Utah Agricultural Experiment Station, Logan, Utah 84322)

Herbicides for Canada thistle and perennial sowthistle in spring barley

Treatment	Rate (Kg/ha)	Percent Stand Reduction 7/7/80 Canada Thistle	Percent Stand Reduction 7/7/80 Perennial Sowthistle	Percent Stand Reduction 8/1/80 Canada Thistle	Percent Stand Reduction 8/1/80 Perennial Sowthistle
DPX4189	0.041	73	30	95	82
DPX4189	0.081	76	53	97	85
DPX4189	0.121	83	63	97	88
DPX4189	0.161	90	70	98	82
DPX4189 + X-77	0.041 + (0.38%)	86	80	99	96
DPX4189 + X-77	0.081 + (0.38%)	86	83	97	97
DPX4189 + X-77	0.121 + (0.38%)	83	83	99	99
DPX4189 + X-77	0.161 + (0.38%)	90	90	98	98
2,4-D ester	1.0	70	53	85	83
2,4-D amine	1.0	73	33	75	62
2,4-D amine + picloram	0.64 + 0.08	76	50	87	78
2,4-D ester + picloram	0.64 + 0.08	80	73	87	78
untreated	--	0	0	0	0

Treatment date - 6/18/80 using bicycle sprayer and 20 gpa carrier.
Population densities at treatment time - Canada thistle, 3 plants/square foot; perennial sowthistle, 8 plants/square foot.

Wild oat control in spring planted barley. Evans, J. O. and R. W. Gunnell. The general area experienced an abnormally wet spring and when treatments were applied, both barley and wild oat plants were yellowed due to excess moisture and cool weather. All treatments except those containing metribuzin were applied 5-28-80 when wild oats were in the 2-4 leaf stage and barley was in the 5 leaf to early tillering growth stage. A trace of rainfall was received during the late afternoon of the 28th, and the following day an additional 0.62 inch of rainfall was recorded. Within one week 3.38 more inches of rain fell. Both the barley and wild oats were therefore subjected to additional excess moisture stress. Following three weeks of dry, warm weather, the crop in the plot area appeared to have recovered completely.

Diclofop methyl at 1.00 lb/A resulted in 98% wild oat control while the .75 lb/A rate averaged 90%. Diclofop methyl at 0.75 lb/A plus DPX4189 at 0.25 ounce active per acre also received a 90% wild oat control rating while Canada thistle control was also excellent. Wild oat control for other compounds applied on 5-28-80 was not as good.

Metribuzin treatments were applied on 6-10-80 with wild oats 4-6 inches tall and tillering, and barley 6-8 inches tall and tillering. The best wild oat control occurred at the 0.50 lb/A rate which was recorded as 86 percent. Three weeks after treatment a slight stunting was noted in the 0.50 lb/A rate, but by late July, no crop height differential between the 0.50 lb/A metribuzin treatment and untreated controls was observable. (Utah Agricultural Experiment Station, Logan, Utah)

Wild oat control in spring planted barley.

Treatment	Rate (lb/A)	Wild Oat Response % Kill	Crop Injury % Stunting
		Evaluated 22 July, 1980	
diclofop methyl	0.75	90	0
diclofop methyl	1.00	98	0
difenzoquat	0.75	56	0
difenzoquat	1.00	74	0
barban[1]	0.38	68	0
SD45328	0.15	26	0
SD45328	0.18	64	0
SD45328	0.20	76	0
SD45328	0.25	64	0
DPX4189	0.50	45	0
diclofop methyl + DPX4189	0.75 + 0.25 oz.	90	0
SD45328 + DPX4189	0.15 + 0.25 oz.	64	0
SD45328 + DPX4189	0.18 + 0.25 oz.	48	0
SD45328 + DPX4189	0.25 + 0.25 oz.	75	0
Control	NA	30	0
metribuzin[2]	0.25	79	0
metribuzin	0.38	75	0
metribuzin	0.50	86	5

[1]Barban applied in 5 gpa water carrier and at 45 psi nozzle pressure.

[2]Treatments containing this herbicide were applied 10 June, 1980, all other treatments applied 5/28/80.

Evaluation of bromoxynil applied through a center-pivot sprinkler for annual broadleaf weed control. Humburg, H. E. and H. P. Alley. Recent reports and interest in applying bromoxynil through a center-pivot sprinkler system for annual broadleaf weed control in small grains prompted this study. Bromoxynil was applied to a 5-acre plot of barley June 10, 1980, at the rate of 0.45 lb ai/A in 0.55 inches of water. There was partial emergence of redroot pigweed and field sandbur at time of application. Those weeds which had emerged were in the following stages of growth. Russian thistle: cotyledon to 6 leaf/0.5 to 1.0 in; redroot pigweed: cotyledon to 2 leaf/0.2 to 0.5 in; field sandbur: 1 to 2 leaf/0.5 to 1.5 in. Air temperature was 80 F, relative humidity 23% with a steady 12 to 16 mph wind SSE at time of treatment. The soil was dry with temperatures of 112, 92, 85 and 74 F at the soil surface and at the 1, 2 and 4-inch depths. The soil was a sand (91.2% sand, 4.8% silt and 4.0% clay) with 1.4% organic matter and a pH of 6.8.

Percentage broadleaf weed control and crop stand was determined by making quadrat counts on June 10 prior to application and on June 27, seventeen days following application. There was no difference in crop stand as a result of the treatment. The broadleaf weed population, which included Russian thistle and redroot pigweed, increased by 31 and 226%, respectively, between the two sampling dates on the untreated area. Disregarding the apparent further germination and establishment of new weeds, and comparing only the counts recorded prior to treatment and seventeen days following treatment, there was an 84 and 22% reduction in Russian thistle and redroot pigweed, respectively. Bromoxynil applied through the center-pivot was more effective on Russian thistle than redroot pigweed. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1071.)

Wild buckwheat control and drybean stand from plots treated with preplant incorporated herbicides. Alley, H. P., N. E. Humburg and G. D. Jackson. Plots were established at the Powell Research and Extension Center May 7, 1980. The preplant herbicides were applied with a 6-nozzle knapsack sprayer in a total volume of 40 gpa water solution. Plots were 9 by 25 ft, arranged in a randomized complete block with three replications. The air temperature, at time of application, was 58 F, the relative humidity 30% and soil temperature 66, 58, 60 and 60 F at the soil surface and depths of 1, 2 and 4 inches, respectively. Herbicides were incorporated with a John Deere roller harrow. Beans (variety Wyo 166) were planted May 9, 1980. Plots were furrow irrigated. Soil was a sandy clay loam (50.6% sand, 25.6% silt and 23.8% clay) with 1.0% organic matter and 7.8 pH.

Weed control and crop stand evaluations were made by counting weeds and beans in one 6 in by 5 ft quadrat per replication.

Trifluralin, pendimethalin, ethalfluralin and metolachlor, as individual herbicides, gave 100% control of the wild buckwheat; whereas, eleven combination treatments gave 100% control of the wild buckwheat. Drybean stands were not significantly reduced by any treatment. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1077).

Wild buckwheat control and drybean stand

Herbicides	Rate lb ai/A	Drybean % Stand	Wild Buckwheat % Control
alachlor	2.5	95	69
alachlor	3.0	100	46
alachlor/trifluralin	2.5 + 0.5	100	77
alachlor/chloramben	2.5 + 1.5	100	100
alachlor/profluralin	2.5 + 0.5	100	100
trifluralin	0.75	96	100
trifluralin/EPTC	1.0 + 2.0	100	100
EPTC	3.0	100	77
EPTC/chloramben	3.0 + 2.0	100	62
EPTC/profluralin	3.0 + 0.5	100	100
profluralin	0.75	91	77
metolachlor	2.5	100	100
metolachlor/chloramben	2.5 + 2.0	100	69
metolachlor/profluralin	2.5 + 0.5	89	100
pendimethalin	1.0	100	100
pendimethalin/EPTC	1.0 + 2.6	100	100
pendimethalin/chloramben	1.0 + 2.0	100	100
NC 20484	0.5	96	77
NC 20484	1.0	100	85
NC 20484/profluralin	0.5 + 0.5	100	100
NC 20484/profluralin	1.0 + 0.5	100	100
NC 20484/EPTC	0.5 + 2.0	100	100
NC 20484/EPTC	1.0 + 2.0	100	100
ethalfluralin	1.0	100	100
ethalfluralin	1.5	100	100
ethalfluralin	2.5	100	100
ethalfluralin/EPTC	1.0 + 2.0	95	100
ethalfluralin/EPTC	1.5 + 2.0	100	92
chloramben/ETPC/trifluralin	2.0 + 3.0 + 0.5	100	100
SN 80786	1.5	91	62
SN 80786	2.0	100	8
SN 80786/EPTC	1.5 + 3.0	100	69
SN 80786/trifluralin	1.5 + 0.5	100	100
Check	---	100	0
plants/linear ft, 6 in band		*1.86*	*0.43*

Weed control, drybean stand and yield from plots treated with preplant incorporated herbicides. Humburg, N. E., H. P. Alley and D. F. Ernst. Plots were established at the Torrington Research and Extension Center on May 21, 1980. The preplant herbicides were applied broadcast with a 6-nozzle knapsack sprayer in a total volume of 40 gpa water solution. Plots were 9 by 25 ft, arranged in a randomized complete block with three replications. The air temperature, at time of application, was 84 F, the relative humidity 26% and soil temperature 110, 97, 88 and 74 F at the soil surface and depths of 1, 2 and 4 inches, respectively. Herbicides were incorporated with a IHC S-tine harrow with Noble finger tines. Beans (variety Pinto UI III) were planted May 22, 1980. Irigation was by a lateral move, low pressure sprinkler. The soil was classified as a sandy loam (63.4% sand, 27.0% silt and 9.6% clay) with 1.3% organic matter and 7.3 pH.

Weed control and crop stand were determined by counting weeds and beans in two 6 in by 5 ft quadrats per replication. Bean yields were obtained by harvesting and threshing the plots on August 29, 1980.

Nine of the treatments gave 100% control of the weed spectrum with a 100% stand; these were: alachlor, NC-20484/EPTC, ethalfluralin, ethalfluralin/EPTC, trifluralin/EPTC, SN-80786, SN-80786/EPTC, SN-80786/trifluralin and EPTC/chloramben. Drybean yields were higher on all treated plots than from the untreated plots, ranging from a low of 775 lb/A on the untreated to a high of 1898 lb/A from the pendimethalin treated plots. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1076).

Weed control, drybean yield and stand

Herbicides	Rate lb ai/A	Percent Control PW	NS	GR	PU	Drybeans % Stand	lb/A
alachlor	2.5	100	100	100	100	100	1473
alachlor	3.0	100	100	100	100	89	1413
alachlor/trifluralin	2.5 + 0.5	100	100	94	100	100	1232
alachlor/chloramben	2.5 + 1.5	100	100	100	100	94	1172
alachlor/profluralin	2.5 + 0.5	100	100	100	94	100	1448
NC 20484	0.5	100	0	87	100	100	1271
NC 20484	1.0	100	95	100	100	100	1045
NC 20484/profluralin	0.5 + 0.5	100	75	100	100	100	1491
NC 20484/profluralin	1.0 + 0.5	100	85	100	100	100	1692
NC 20484/EPTC	0.5 + 2.0	100	95	100	94	90	1520
NC 20484/EPTC	1.0 + 2.0	100	100	100	100	100	1790
pendimethalin	1.0	100	75	100	88	100	1641
pendimethalin/EPTC	1.0 + 2.6	100	95	100	100	100	1898
pendimethalin/chloramben	1.0 + 2.0	100	90	100	100	100	1888
ethalfluralin	0.625	100	65	100	94	100	1686
ethalfluralin	0.75	100	50	100	100	100	1838
ethalfluralin	1.5	100	100	100	100	100	1860
ethalfluralin/EPTC	0.625 + 2.0	100	85	94	100	91	1099
ethalfluralin/EPTC	0.75 + 2.0	100	100	100	100	100	1584
trifluralin/EPTC	0.5 + 2.0	100	100	100	100	100	1314
SN 80786	1.5	100	100	100	100	100	1610
SN 80786	2.0	93	100	100	100	100	1552
SN 80786/EPTC	1.5 + 3.0	100	100	100	100	100	1841
SN 80786/trifluralin	1.5 + 0.5	100	100	100	100	100	1680
EPTC	3.0	93	35	75	88	100	1194
trifluralin	0.75	100	95	100	100	100	1665
profluralin	0.75	100	70	94	100	100	1711
EPTC/profluralin	2.0 + 0.5	100	60	94	100	93	1520
EPTC/chloramben	2.0 + 2.0	100	100	100	100	100	1661
metolachlor	2.5	93	90	100	94	90	1537
metolachlor/profluralin	2.5 + 0.5	100	95	100	94	100	1782
metolachlor/chloramben	2.5 + 2.0	100	100	94	100	99	1645
chloramben/EPTC/trifluralin	2.0 + 2.0 + 0.5	100	95	100	100	99	1822
Check	---	0	0	0	0	100	775

Abbreviations: PW = redroot pigweed; NS = hairy nightshade; GR = green foxtail and stinkgrass; PU = common purslane.

Evaluation of preplant incorporated herbicides and delay of incorporation of selected thiocarbamate herbicides on weed control and corn stand. Humburg, N. E., H. P. Alley and D. F. Ernst. Plots were established at the Torrington Research and Extension Center to evaluate individual and/or herbicide combinations for early season and late season weed control along with comparing the effect of delayed incorporation of selected thiocarbamate herbicides on their weed control effectiveness in corn (variety NC^+ 4666). Herbicide treatments were applied May 20 and 21, 1980, to plots 9 by 30 ft, arranged in a randomized complete block with three replications. Herbicides were incorporated with a IHC S-tine harrow with Noble finger tines, twice over, at 0.5, 7.5 and 28 hr after application as indicated in the following table. The corn was planted May 22, 1980, and the plots irrigated with a lateral move, low pressure sprinkler system. Soil was classified as a loamy sand (79.0% sand, 13.2% silt and 7.8% clay) with 1.2% organic matter and a pH of 7.2.

Weed control and crop stand evaluations were made June 6 by counts in two 6-inch by 5-ft quadrats per replication and by visual evaluations on October 11, 1980. Data accumulated indicate no difference in the weed control obtained from incorporating EPTC + R-25788 (Eradicane), butylate + R-25788 ($Sutan^+$) or vernolate + R-25788 (Surpass) immediately after treatment or waiting 7.5 or 28 hr. Fifteen of the 21 treatments gave 100% control of the weed spectrum as determined by counts at the early evaluation date. Alachlor was weak on common lambsquarters and redroot pigweed at the 3.0 lb ai/A rate. The addition of a triazine herbicide provided full-season weed control, e.g., EPTC + R-25788/atrazine at the 3.0 + 1.0 and 3.0 + 1.5 lb ai/A gave total weed control the entire season. Vernolate/(R-25788) provided more consistent and a higher percentage weed control into the late season than EPTC/(R-25788) or butylate/(R-25788). (Wyoming Agric. Exp. Sta., Laramie 80271, SR 1074).

Weed control and corn stand

Herbicides	Rate lb ai/A	Corn[1] Stand %	Percent Control[1] June 6 NS	June 6 LQ	June 6 PW	June 6 GR	October 11 LQ	October 11 PW	October 11 GR
Inc. 28 hr after application									
EPTC + (R-25788)	4.0	86	100	100	100	100	70	90	90
butylate + (R-25788)	4.0	90	100	100	100	100	70	90	98
vernolate + (R-25788)	4.0	86	100	100	100	100	95	100	90
Inc. 7.5 hr after application									
EPTC + (R-25788)	4.0	86	100	100	100	100	80	92	88
butylate + (R-25788)	4.0	90	100	100	100	95	80	87	97
vernolate + (R-25788)	4.0	87	100	100	100	100	90	98	99
Inc. 0.5 hr after application									
EPTC + (R-25788)	4.0	86	100	100	100	100	77	93	87
butylate + (R-25788)	4.0	83	100	100	100	100	77	87	80
vernolate + (R-25788)	4.0	87	100	100	100	95	87	100	100
EPTC + (R-25788)/atrazine 4L	3.0 + 1.0	91	100	100	100	100	100	100	100
EPTC + (R-25788)/atrazine 4L	3.0 + 1.5	91	100	100	100	100	100	100	100
butylate + (R-25788)/atrazine 4L	3.0 + 1.0	84	100	100	100	100	100	100	98
butylate + (R-25788)/cyanazine 4L	3.0 + 1.5	94	100	100	100	100	90	100	100
vernolate + (R-25788)/cyanazine 4L	3.0 + 1.5	96	100	100	100	100	97	100	100
alachlor	3.0	83	100	55	80	100	50	60	73
alachlor	4.0	91	100	100	100	100	77	77	83
alachlor/atrazine 4L	2.0 + 1.0	84	100	100	100	90	98	100	95
alachlor/atrazine 4L	3.0 + 1.0	94	100	100	100	100	100	100	95
cyanazine 4L/atrazine 4L	1.6 + 0.8	99	100	100	100	95	93	100	88
metolachlor/atrazine	1.25 + 1.0	87	100	100	100	100	95	100	93
metolachlor/atrazine	1.5 + 1.2	88	100	100	100	85	98	100	93
Check	---	100	0	0	0	0	0	0	0
plants/ft of row, 6 in band		*2.3*	*0.5*	*0.3*	*0.3*	*0.7*			

[1]Weed counts and crop stand evaluations June 6. Visual evaluations October 11, 1980.
Abbreviations: NS = hairy nightshade; LQ = common lambsquarters; PW = redroot pigweed; GR = 70% field sandbur, 20% green foxtail, 5% witchgrass and 5% stinkgrass.

Evaluation of postemergence-applied herbicides for weed control in field corn. Humburg, N. E., H. P. Alley and D. F. Ernst. The postemergence herbicides were applied June 19, 1980, when the corn was 3 to 5 leaf/4 to 9 in tall and the weeds were: redroot pigweed: 4 leaf/1 to 3 in; common lambsquarters: 2 to 8 leaf/0.5 to 2 in; hairy nightshade: 2 to 8 leaf/0.5 to 2 in; field sandbur: 2 leaf to 3 tiller/0.5 to 3.0 in. All herbicides were applied in 40 gpa water solution with a 6-nozzle knapsack sprayer. Plots were 9 by 30 ft, replicated three times in a randomized complete block. Soil was a loamy sand (81.2% sand, 12.4% silt and 6.4% clay) with 1.5% organic matter and pH 7.1. The sky was overcast, air temperature 70 F and soil temperature 69, 70, 71 and 71 F at the soil surface and 1, 2 and 4 inch depths, respectively.

Corn stand and weed counts were made August 11, 1980, by recording plant counts in two 6 in by 5 ft quadrats per replication. The predominant weeds in August were redroot pigweed and field sandbur. Only those treatments which contained atrazine in the combination suppressed sandbur populations. Broadleaf weed control was generally excellent from all treatments with some species showing resistance. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1075).

Weed control resulting from postemergence treatments

Herbicides[1]	Rate lb ai/A	Percent Control[2]			
		NS	LQ	PW	SB
dicamba/alachlor	0.25 + 3.0	100	99	93	0
dicamba/alachlor	0.5 + 3.0	99	99	89	0
dicamba/alachlor	0.25 + 1.0	100	99	71	0
dicamba/alachlor	0.5 + 1.0	100	100	80	0
metolachlor/atrazine (pre mix)	1.25 + 1.0	100	100	99	0
metolachlor/atrazine (pre mix)	1.5 + 1.2	100	100	100	39
NC-23804	1.0	0	0	0	0
NC-23804	2.0	100	100	2	0
alachlor/atrazine	2.0 + 1.0	100	100	100	28
alachlor/atrazine	2.5 + 1.0	100	100	99	0
metolachlor/atrazine	1.5 + 1.0	100	100	100	41
metolachlor/dicamba	1.5 + 0.25	100	100	71	0
metolachlor/2,4-D amine	1.5 + 0.25	99	99	27	0
Check	---	0	0	0	0
plants/ft of row, 6 in band		*0.6*	*1.2*	*1.7*	*0.3*

[1]Herbicides applied June 19, 1980.
[2]Weed counts taken August 11, 1980.
Abbreviations: NS = hairy nightshade; LQ = common lambsquarters; PW = redroot pigweed; SB = field sandbur.

Preplant incorporated herbicides for weed control in field corn. Smith, N.L., R.F. Norris and T.E. Kearney. A field study was established at the Davis experimental farm to evaluate crop tolerance and weed control effectiveness of individual and herbicide combinations in field corn (Pioneer 3780). Herbicides were applied to preformed 30 inch beds with a CO_2 backpack sprayer calibrated to deliver 40 gpa spray volume on June 5, 1980. All treatments were incorporated to a 2 inch depth with a Marvin Rowmaster power driven incorporator. Four replications were employed utilizing a 5 ft. (2 beds) by 20 ft. plot size. Soil type was sandy loam. Corn was planted June 6 at a 2 inch depth. The trial was furrow irrigated June 7 and as required throughout the duration of the experiment.

Visual evaluations for phytotoxicity and weed control were made July 8, with weed counts (average of 5.4 sq. ft. per plot) taken September 5th. Evaluations are based only on the incorporated band (10 inch width) down the bed top.

Cyanazine combined with either alachlor, metolachlor, PPG 225 or PPG 844 exhibited excellent control of barnyardgrass, redroot pigweed and hairy nightshade with no crop injury. Metolachlor proved more effective on nightshade than alachlor. At higher rates SN 80786 was exhibiting excellent weed control. EPTC gave effective weed control but should only be used in conbination with a safening agent on corn. PPG 225 and PPG 844 exhibited good broadleaf control at the higher rates. No conclusions could be made from this experiment on the effectiveness of R33865 (an extender) when combined with EPTC. (University of California Cooperative Extension, Davis, CA 95616).

Preplant incorporated herbicides for weed control in corn

Herbicide	Lb. Ai/A	7-8-80 control* Phyto.	7-8-80 control* Barnyard-grass	7-8-80 control* R.R. pigweed	7-8-80 control* Hairy nightshade	9-5-80 weed counts Barnyard-grass	9-5-80 weed counts R.R. pigweed	9-5-80 weed counts Hairy nightshade
alachlor	2	0	10.0	9.8	6.8	0.25	0.13	0.13
alachlor	3	0	10.0	10.0	9.9	1.88	0	0.5
metolachlor	2	0	10.0	10.0	9.8	0	0.25	0.5
metolachlor	3	0	10.0	10.0	10.0	0	0.13	0.13
cyanazine	1.5	0	7.5	9.6	10.0	1.63	0	0
cyanazine	3	0	8.0	9.6	10.0	3.0	0	0
EPTC + R-25788	4	0	9.7	9.0	9.9	0.88	0.25	0.38
EPTC = R-25788	8	0	8.5	8.2	8.5	1.25	0.63	0.13
butylate + R-25788	4	0	8.8	6.3	6.5	2.63	1.88	0.13
butylate + R-25788	8	0	9.7	8.9	9.4	0.75	0.63	0
EPTC	4	3.0	8.8	9.1	8.9	2.88	0.25	0.13
EPTC	8	6.8	10.0	9.4	9.9	0.25	0.25	0.25
PPG 844	0.375	0	1.8	7.0	7.0	3.63	0.13	0.25
PPG 844	0.75	0	2.3	9.3	7.6	5.75	1.75	0.25
PPG 844	1.5	0	2.8	10.0	9.5	2.88	0	0.5
PPG 225	0.5	0	2.5	6.3	5.5	4.88	0.13	0.13
PPG 225	1	0	3.5	9.9	9.9	3.88	0	0.13
PPG 225	2	0	5.3	9.9	9.9	7.25	0	0.13
SN 80786	0.75	0	9.5	8.0	7.3	1.63	1.25	0.25
SN 80786	1.5	0	9.6	9.8	9.4	4.63	1.0	1.38
SN 80786	3	0.5	10.0	10.0	10.0	0.13	0.25	0.63
RE 28269	0.125	0	7.5	2.5	1.8	2.5	1.28	1.5
RE 28269	0.25	0	5.5	2.5	3.3	2.25	1.25	0.25
RE 28269	0.5	0	9.4	8.0	8.1	0.75	0.5	0.5
RE 28269	1	0	10.0	8.8	8.5	1.13	0.13	0.25
EPTC + R-25788 + R-33865	4	0	10.0	9.5	9.5	0.25	0.38	0
EPTC + R-25788 + R-33865	8	0	10.0	9.9	9.9	0	0.25	0.13
EPTC + 29148	4	2.3	8.8	7.0	8.5	0.88	1.75	0.25
EPTC + 29148	8	4.5	9.8	8.8	9.7	0.25	0.75	0.75

Preplant incorporated herbicides for weed control in corn
(continued)

Herbicide	Lb. Ai/A	Phyto.	7-8-80 control* Barnyard-grass	R.R. pigweed	Hairy nightshade	9-5-80 weed counts Barnyard-grass	R.R. pigweed	Hairy nightshade
cyanazine + alachlor	1.5 + 3	0	10.0	10.0	10.0	0	0	0.13
cyanazine + alachlor	3 + 3	0	10.0	10.0	10.0	0	0	0.88
cyanazine + metolachlor	1.5 + 3	0	9.9	10.0	10.0	0	0.13	0
cyanazine + metolachlor	3 + 3	0	10.0	10.0	10.0	0	0	0.38
alachlor + PPG 225	3 + 1	0	10.0	10.0	10.0	0.13	0	0.13
alachlor + PPG 225	3 + 2	0	10.0	10.0	10.0	0	0	0.25
alachlor + PPG 844	3 + 0.75	0	10.0	10.0	9.9	0	0	0
alachlor + PPG 844	3 + 1.5	0	10.0	10.0	9.8	0.88	0	0.63
CDEC	6	0	6.5	7.0	3.5	2.13	0.13	0.25
CDEC	9	0	9.1	9.5	4.8	1.63	0.25	0.38
propachlor	4	0	9.5	9.1	5.9	0.75	0.38	0.63
propachlor	6	0	9.8	9.3	6.5	2.0	0.13	0.38
pendamethalin	1	0	9.9	9.9	6.5	0.13	0	0.38
pendamethalin	2	0	10.0	9.9	7.3	0	0.25	0
control	-	0	0	0	0	9.88	1.25	0.63
control	-	0	0	0	0	10.25	2.88	1.13

*control = none 10 = complete control
Data is average of 4 reps

Postemergence herbicides for weed control in field corn. Smith, N.L., T.E. Kearney and R.F. Norris. This study was established on the University of California at Davis experimental farm to evaluate postemergence weed control activity and crop tolerance of various registered and experimental herbicides. The plots were seeded (Pioneer 3780) on June 6, 1980 and furrow irrigated up. A uniform stand of barnyardgrass, redroot pigweed and hairy nightshade emerged along with the corn. Herbicides (except ametryn) were applied broadcast June 23 using a CO_2 backpack sprayer calibrated to deliver a 20 gpa. spray volume. Weed growth stage at this time was, barnyardgrass: seedling to tiller initiation (2" height), pigweed: seedling to 4 leaf, nightshade: seedling to 4 leaf (mostly 2 leaf). Corn was approximately 6-8 inches tall. The day was clear and calm with a temperature range of 55° to $88^{\circ}F$ ($80^{\circ}F$ at time of application). Four replications were employed with a plot size of 100 ft^2 (5 ft by 20 ft). Ametryn was applied as a directed spray (20 gpa.) June 30 when the corn was 12 inches tall.

Evaluations for corn phytotoxicity were made June 30 and July 9. Some leaf burn was noted on June 30 from PPG 844, cyanazine and the high rate of AXF 1125. By July 9 the crop had recovered and little phytotoxicity was noted. Corn was almost completely killed from all rates of DPX 4189. Ametryn must be carefully directed or crop injury will result.

Control of barnyardgrass was poor for all materials except the directed ametryn + oil application. Excellent control of pigweed was exhibited from all materials except bentazon, PPG 225 and the low rate of 2,4-D amine. Bentazon, DPX 4189 and 2,4-D amine appeared weak on nightshade. Bromoxynil, AXF 1124 and AXF 1125 did not control purslane. (University of California Cooperative Extension, Davis, CA 95616)

Postemergence weed control in field corn

Herbicide	lb/A	6/30/80 Crop Phyto	7/9/80 Crop Phyto	Barnyard grass	Redroot Pigweed	Hairy Nightshade
atrazine + oil	1 + 1 gal	0	0	0	10	10
2,4-D amine	0.25	0.3	0	0.3	3.5	0.8
2,4-D amine	0.5	0	0	0	8.3	3.0
dicamba	0.125	0	0	0	8.0	5.8
dicamba	0.25	0	0	0	8.9	8.3
bentazon	0.25	0	0	0	0.5	0
bentazon	0.5	0.3	0	0.3	6.5	5.3
bentazon	1.0	0	0	0	4.3	3.0
bromoxynil (344)	0.25	0	0	0	8.8	9.5*
bromoxynil	0.5	0.8 B	0	0	9.8	10*
bromoxynil (AXF 1050)	0.5	1.5 B	0	0	9.7	9.3*
bromoxynil	1.0	3.3 B	0.5	0.3	10	10*
PPG 225	0.25	0.3	0	0	7.5	9.3
PPG 225	0.5	0.3	0	0	2.5	6.0
PPG 225	1.0	0	0	0	5.8	8.8
PPG 844	0.25	1.5 B	0.3	0	9.8	9.1
PPG 844	0.5	2.5 B	0.3	0	9.9	10
PPG 844	1.0	3.0 B	0.8	0	10	10
cyanazine + oil	1 + 1	3.8 B	0.8	0	8.9	9.1
cyanazine + oil	2 + 1	4.0 B	1.5	0	9.3	9.3
AXF 1125	1	0.3	0	0	9.9	8.7*
AXF 1125	2	0.3	0	0.3	9.9	6.3*
AXF 1125	4	2.0 B	0.3	0.3	9.8	9.5*
AXF 1124	2	0	0	0	10	10*
DPX 4189	0.25 oz.	3.8 S,C	7.5	0	10	1.8
DPX 4189	0.5	4.5 S,C	8.0	0	10	4.3
DPX 4189	1.0	4.0 S	8.0	0.3	10	2.0
ametryn	2.0	-	3.5	7.5	10	10
oil (Orchex N-795)	1 gal	0	0	0	0	0
control	-	0	0	0	0.8	1.0

Symtom: B = Burn
S = Stunted
C = Chlorotic

* Purslane not controlled

0 = no control or phytotoxicity
10 = complete control

Cotton yields from preplant and preemergence fluridone treatments. Anderson, W. Powell and Gary Hoxworth. In 1980, fluridone was applied preplant and preemergence at dosages of .035, .07, .14, .28, .37, and .56 kg/ha (1/32 thru 1/2 lb/A) on April 1 and May 9, respectively, to cotton (Acala var. 1517-75) planted April 29. In addition, a tank-mix of .84 kg/ha trifluralin plus 1.8 kg/ha prometryn was applied preplant for comparison as a treated control; a hand-hoed plot served as an untreated control. Individual plots were 3.05 m by 12.2 m in size, encompassing three cotton rows 9.8 m long. Each treatment was replicated seven times, and the replications were arranged in a 7 x 7 Latin Square design. The preplant and preemergence treatments were paired side-by-side for each respective dosage of fluridone and randomized as a block; the treated control was paired with the hand-hoed control.

With the exception of annual morningglories (tall and woolly), weeds were not a problem in the experimental area. Where annual morningglories were not controlled by a respective herbicide treatment, it was necessary, later in the season to control these weeds by other means. This was accomplished by the use of glyphosate applied to the lower portions of the morningglory vines as a directed basal-spray under the cotton foliar canopy.

None of the dosages of fluridone applied preemergence effectively controlled annual morningglories emerging along with the cotton seedlings and prior to the first furrow irrigation. A new flush of morningglory seedlings emerged after the first and second irrigations, but these seedlings were completely white in color and died within a few days of emergence. It would appear that the preemergence fluridone treatments were leached into the soil where it could then be absorbed by the weed seedlings.

Preplant applications of fluridone at dosages of .28, .37, and .56 kg/ha provided 100 percent control of annual morningglories for the entire growing season, including those that emerged prior to the first irrigation; dosages of .14 kg/ha or less did not adequately control morningglories.

Weed control from the trifluralin/prometryn treatment provided essentially 100 percent control of all weeds for the entire season. The preplant fluridone treatments of .28, .37, and .56 kg/ha also provided 100 percent, season-long, weed control.

The cotton was harvested with a spindle-type machine harvester. Each plot was picked twice, with the 1st pick on November 7 and the 2nd pick on December 8. The respective average yields for each treatment are recorded in the table. It is of interest to note the high yield obtained from the .56 kg/ha (1/2 lb/A) dosage of fluridone, as compared to the yields from the treated control and the .28 and .37 kg/ha fluridone treatments applied preplant -- all of these plots were weed-free season-long. This higher yield was also obtained in another cotton experiment at this location in 1980, and reported in another abstract included in this publication. As speculation, is the .56 kg/ha dosage of fluridone enhancing cotton yields?
(Agr. Expt. Sta., New Mexico State University, Las Cruces, NM 88003.)

Yields of seed-cotton from preplant and preemergence fluridone (Brake^{TM}) treatments applied April 1 and May 9, 1980, respectively.

fluridone kg/ha	Average yields (gm/plot) 1st pick	2nd pick	Total av. yield (gm)
Hoed check	2168	532	2700
Treated check	2830	698	3528
Preplant treatments			
.035	2137	680	2817
.07	2058	534	2592
.14	3016	630	3646
.28	3023	604	3627
.37	2732	554	3286
.56	3498	598	4096
Preemergence treatments			
.035	2127	644	2771
.07	1954	481	2435
.14	2066	522	2588
.28	2476	518	2994
.37	1968	541	2509
.56	2726	577	3303

Tall and woolly morningglories were predominant weeds. It was necessary to eventually control these weeds with basal application of glyphosate as they were not initially controlled with fluridone in the preemergence and low dosage preplant treatments.

The treated check consisted of a tank-mix of trifluralin and prometryn applied at dosages of 0.84 and 1.8 kg/ha, respectively.

Each treatment was replicated 7 times, and the values in table above represent the average of these 7 replications.

Effect on maturing cotton plants of over-the-top applications of glyphosate. Anderson, W. Powell and Gary Hoxworth. It was noted in previous years that attempts to kill maturing cotton plants in areas bordering research plots resulted in kill of young terminal growth, but usually not the older plant parts, and that maturation and opening of bolls appeared normal. It appeared, from these observations, that glyphosate could be used to terminate unwanted plant growth after crop-boll-set without adverse effects on yields and, similarly, could be safely used to control weeds, such as annual morningglory and johnsongrass, in maturing cotton. In 1980, glyphosate was applied in over-the -top aqueous sprays to maturing cotton (var. Acala 1517-75) plants in about 55 gal/A of water at dosages of 1.0 and 2.0 lb ae/A on August 1 and to different plants at 1.5 and 3.0 lb ae/A on August 21. At time of application on either date the cotton plants were over three feet high, with lower bolls opening, upper bolls in various stages of development, and flowers still opening in the upper portions of the plants. The experimental area was free of weeds. In general, it appeared that glyphosate did not adversely affect flower development, boll maturation or opening, and young terminal growth was killed. At dosages of 2.0 and 3.0 lb ae/A the main stems of some cotton plants blackened and were killed, as were the flowers and bolls on these plants; however, the older more mature parts of cotton plants receiving the 1.0 and 1.5 lb ae/A dosages did not appear to be adversely affected. Each glyphosate treatment was replicated twice and each plot was 2-rows of cotton plants 32 ft long, with single, untreated rows of plants bordering the sides of each plot. The plots were harvested by hand in November to determine yields. For comparison, two 32-ft-long rows of untreated cotton growing adjacent to the treated plots were also harvested. Cotton yields are shown in the table. It is acknowledged that this experiment is exploratory. Indications are that maturing cotton plants will tolerate over-the-top applications of glyphosate at dosages of 1.5 lb ae/A or less without yield reduction. It was not determined whether or not glyphosate was present in the cotton seed. (Agricultural Experiment Station and Department of Agronomy, New Mexico State University, Las Cruces, New Mexico, 88003.)

Cotton yields from plants treated with over-the-top applications of glyphosate.

glyphosate lb ae/A	Seed-cotton yields gm/plot Rep. 1	Rep. 2	Av.
Applied August 1, 1980.			
1.0	8235	7995	8115
2.0	5330	4281	4806
Applied August 21, 1980.			
1.5	6932	6832	6882
3.0	4167	5117	4642
Untreated	5925	--	5925

Weed control and cotton yields from preplant fluridone treatments. Anderson, W. Powell and Gary Hoxworth. Fluridone has provided excellent selective weed control in cotton in research plots at this location over the past three years. In 1980, fluridone was applied preplant January 10 at dosages of 0.0, 0.063, 0.125, 0.25, and 0.5 lb/A and soil incorporated about 2-inches deep with a tandem-disk passing twice, in opposite directions, over the treated area. Each treatment was replicated five times and the replications were arranged in a 5 x 5 Latin Square design. Individual plot size was 10 ft wide by 30 ft long, with 3 rows of cotton per plot. After cotton emergence, plants were removed from either end of each row of cotton to provide a work-way between ends of adjacent plots, leaving cotton rows 22 ft in length. A single, untreated row of cotton separated adjacent plots and provided a means of determining weed infestation within the experimental area. Immediately after soil incorporation of fluridone, the soil was listed, forming high peaked beds, in preparation for pre-irrigation. The field was pre-irrigated March 25. Cotton (var. Acala 1517-75) was seeded April 29. Following seeding, nothing else was done in the experimental area except for watering (furrow irrigation) as needed, one fertilizer application, and one treatment for boll-borer control. However, the untreated control plots were hoed thrice during the season, with the first hoeing not made until the cotton plants were under stress from weed competition. The dominant weed present was barnyardgrass, and the stand of this weed, unchecked, was so dense and aggressive as to preclude other weed species.

Visual evaluations of degree of weed control were made July 9. The 0.063 lb/A dosage was ineffective, and these plots were overgrown with a dense stand of barnyardgrass. The 0.125 lb/A dosage provided 95 percent or better control of barnyardgrass and, with the exception of yellow nutsedge, no other weed species invaded the treated areas. Of the yellow nutsedge plants present, the foliage varied among plants from green, mottled green/white, to white. Dosages of 0.25 and 0.5 lb/A provided essentially 100 percent control of barnyardgrass and, with the exception of yellow nutsedge, no other weed species invaded the treated areas. Control of yellow nutsedge with 0.25 lb/A appeared good, but plants of this weed were scattered in the treated areas. The 0.5 lb/A dosage provided 99 percent or better control of yellow nutsedge. By harvest-time, ten months after fluridone application, the respective degree of weed control as noted above remained unchanged. It was noted in July that a flush of barnyardgrass seedlings was emerging in the hoed and fluridone-treated areas. In the treated areas, these seedlings were white, rather than green, and they did not survive past the 2-leaf stage. It was apparent, however, that fluridone did not prevent germination of barnyardgrass seed. Cotton plants showed no adverse effects from the fluridone treatments, other than an occasional slight chlorotic-mottling of primary leaves early in the season on seedlings growing in plots treated with the 0.5 lb/A dosage.

To obtain yield data, the cotton was handpicked from the center-row of each 3-row plot. It was obvious that many more cotton bolls were open and ready to pick earlier in fluridone-treated plots than in the hoed plots. Thus, two handpickings were made, the first October 21-22 and the 2nd November 13-14. Yield data from these pickings are recorded in the table. As speculation, does fluridone, at dosages of 0.25 to 0.5 lb/A, enhance cotton yield or are the high yields shown due entirely to removal of weed competition?? (Agr. Expt. Sta. and Agronomy Dept., New Mexico State University, Las Cruces, N.M. 88001.)

Yields of seed-cotton from preplant fluridone treatments applied January 10, 1980.

fluridone lb/A	Total yield (gm)[a] 1st pick	2nd pick	Yield[b] Av.
hoed check[c]	2363	3682	604
0.063	2452	766	322
0.125	6506	2197	871
0.25	8406	3912	1232
0.50	9016	4225	1324

[a]Total from 5 replications.

[b]Total from both pickings and then recorded as average of 5 replications.

[c]Hoeing was not begun until after cotton plants were under stress from weed competition.

Weed control and rubber production in guayule (*Parthenium argentatum*). Whitworth, J.W. and Don Clark. Since previous work has indicated that transplant guayule has adequate tolerance to the dinitroaniline herbicides, our research has been directed towards finding broader spectrum herbicides which will not adversely affect the stand or rubber and resin production of guayule.

When applied over-the-top of guayule established for eight months, diesel oil, fluridone, and simazine appeared promising. Then as the plants were analyzed for rubber content, there were indications that the adverse effect of granular simazine on the production of rubber and resins might be more serious than the slight reduction in stand indicated, Table 1. In a subsequent experiment when the herbicides were applied prior to transplanting, fluridone proved too toxic, and the granular simazine again caused only a slight reduction in stand, Table 2. Whether this slight reduction in stand will again be accompanied by a marked reduction in rubber and resin,remains to be seen. The herbicide of choice in this experiment would be oxyfluorfen since it gave weed control performance almost equal to pendimethalin on *Amaranthus*, and it is known to be effective on weed species which are tolerant to dinitroanilines. Weed populations in these experiments were too light and removed by hand too soon after treatment to have influenced yields of rubber and resin.

As direct-seeded guayule is less tolerant of herbicides than transplant guayule, finding an effective herbicide is more of a problem. Of more than 20 herbicides previously tested in greenhouse and field tests, only two showed any promise. DCPA caused no reduction in stands and pendimethalin from 10 to 20 percent reduction. An experiment with 12 cultivars of guayule produced results in keeping with previous data --no reduction in stand with DCPA and 20 percent reduction with pendimethalin (data not shown).

Table 1. Response of transplant guayule to over-the-top applications of herbicides

Herbicides	Rate ai/A	% Reduction as compared to untreated				
		Plant stand	Rubber		Resins	
			%	lb/A	%	lb/A
diesel oil	40 gal.	0	0	0	0	0
fluridone	1.6 lb.	0	0	8	2	9
simazine WP	2.0 lb.	2	8	0	11	9
simazine granular	2.0 lb.	9	17	34	7	26

Table 2. Performance of herbicides applied as preplant treatments and incorporated into the soil before transplanting 3-month old guayule plants.

Herbicides	Rate lb ai/A	% Reduction as compared to untreated		
		Guayule stand	Amaranthus sp. stand	
		10/9/80	6/27/80	10/9/80
pendimethalin	0.75	0	86	91
oryzalin	0.75	0	49	86
oxyfluorfen	0.50	0	84	71
simazine granular	0.75	10	59	71

(New Mexico State University, Agricultural Experiment Station, Las Cruces, New Mexico 88003)

Gumweed production trials in Idaho. Brenchley, R. G. and D. L. Zamora. Since the advent of the so-called oil crunch, weed scientists have been interested in the use of weedy plants to produce petroleum products. Gumweed, *Grindelia squarrosa* (Pursh) Dunal, has been found to produce certain resins which when extracted are capable of being used for petroleum production. An experiment was established at the Southwest Idaho Research and Extension Center near Parma, Idaho to determine the feasibility of growing gumweed for this purpose.

During the summer (July and August) of 1979, seedling gumweed plants (6-10 leaf stage) were taken from a weed nursery and transplanted into an experimental area which was prepared and fertilized with four nitrogen levels (0, 50, 100, 200 lb/A). These plants were transplanted at different row and plant spacing intervals to determine the affect of plant populations on the production of total dry matter. The experiment was designed as a split-split plot configuration using nitrogen levels as the main plots, row spacings as the sub-plots and plant spacings as the sub-sub plots. Main plots were 10 by 63 ft., sub plots were 7 by 40 ft. and sub-sub plots were 7 by 10 ft. All plots were replicated four times. Plants which died due to the transplanting procedure or during the winter were replaced during the spring of 1980. About 10 percent of the stand was reduced during the winter of 1979-80. Gumweed was harvested on August 20-21, 1980 by hand clipping 40 sq. ft. per sub-sub plot. Fresh weights were taken in the field and converted to dry weight after sub samples were oven dried.

Results of this experiment show that nitrogen levels had very little effect on the total dry matter production of gumweed. Plant populations greatly affected dry matter production with treatment spacings of 6 by 6 inches producing the maximum yields.

Table 1. Gumweed production results as affected by nitrogen levels and plant densities.

Nitrogen lb/A	Row Spacing inches	Plant Spacing inches	Yield[1/] lb/A
0	6	6	9,957
	12	12	8,588
	24	24	3,317
50	6	6	11,948
	12	12	6,347
	24	24	5,395
100	6	6	12,029
	12	12	4,978
	24	24	6,428
200	6	6	10,374
	12	12	7,055
	24	24	4,561

1/ Yield of oven dry material per acre.

Insect Problems. During the summer of 1980, we observed an insect larva identified as *Heliothis phloxiphaga* (a close relative of the corn earworm) which was feeding on the seedhead of gumweed. Although this insect was affecting less than one percent of the seedheads its potential hazard should be noted.

Disease Problems. Plant disease problems observed during the spring and summer of 1980 showed that *Rhizoctonia solani* and *Sclerotinia sclerotiorum* were primary causal pathogens which reduced the stand of gumweed by up to 45 percent. Secondary infections included *Fusarium* sp. and *Botrytis* sp. organisms. It was observed that these organisms were closely related to nitrogen levels with high nitrogen plots being the most affected. The following table shows the disease incidence as related to nitrogen levels. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Table 2. Gumweed disease incidence related to N-levels.

Nitrogen Levels (lb/A)	% Disease Incidence
0	17
50	30
100	32
200	45

EPTC persistence trial with extenders. McAuliffe, David, Bill D. Brewster, and Arnold P. Appleby. The effectiveness of EPTC used as preplant incorporated applications to control yellow nutsedge *(Cyperus esculentus)* in certain fields in the Grand Island area of Yamhill County, Oregon, has diminished significantly over the past few years. A possible explanation for the loss in activity is an increased population of microorganisms capable of degrading the EPTC.

A field trial was established in late May to evaluate the rate of EPTC loss, to substantiate the evidence for microbial degradation, and to evaluate the ability of PPG-124 extender in prolonging the activity of EPTC. Comparisons were also made between the Stauffer extender R-33865 and PPG-124.

Methyl bromide was used as a fumigant 6 days prior to herbicide treatments. The plots were 8 by 25 ft and the experimental design was a randomized block with four replications. 'Cayuse' spring oats were planted weekly for six consecutive weeks. Four weeks after planting, the oats were evaluated and harvested for dry weights.

No significant differences in dry weights were found among the check, the 3.0 lb ai/A, and the 6.0 lb ai/A rate of EPTC 2 weeks after treatment. Fumigation with methyl bromide prior to EPTC application did substantially increase the life of the EPTC, indicating the loss of the herbicide was likely a result of microbial activity. Additions of PPG-124 or R-33865 provided still greater activity from the EPTC. EPTC and R-33865 applied to fumigated plots was the most effective treatment in controlling the oats. The average dry weight of oats planted 6 weeks after treatment was only 7% of the check.

R-33865 added to EPTC provided increased herbicide activity over the EPTC alone resulting in a 63% reduction in oat growth after 10 weeks. Additions of PPG-124 did not extend the life of the EPTC past that for EPTC alone when the extender was used at a low rate. Only a 6.0 lb ai/A rate of EPTC and a 1.5 lb ai/A rate of PPG-124 resulted in increased oat control. At these rates, there were significant differences with the check but no significant differences were demonstrated with the 6.0 lb ai/A rate of EPTC alone. (Crop Science Department, Oregon State University, Corvallis 97331)

EPTC Persistence Trial with Extenders
Scoggins Farm, Grand Island, Yamhill County, Oregon
1980

Treatments	Rate lb a.i./A	Dry weight (grams) Average values of weekly plantings Planting date - 1980: May 27	June 3	June 10	June 17	June 23	July 1	July 8
1. EPTC	3.0	0.81	9.26	15.41	31.46	33.14	20.34	16.60
2. EPTC	6.0	0.29	6.50	14.41	32.55	24.03	20.28	13.95
3. EPTC + PPG-124	3.0 + 0.38	0.76	9.99	16.66	30.79	28.38	28.05	16.21
4. EPTC + PPG-124	3.0 + 0.75	1.00	7.35	15.70	31.51	32.35	24.33	17.88
5. EPTC + PPG-124	6.0 + 0.75	0.14	5.94	18.69	34.25	22.18	18.58	11.31
6. EPTC + PPG-124	6.0 + 1.5	0.45	5.61	11.20	27.26	20.56	21.33	11.60
7. EPTC + R-33865	3.0 + 0.5	0.18	0.78	3.93	29.75	13.39	14.81	8.91
8. EPTC + methyl bromide[a]	3.0	0.12	0.16	1.34	26.53	14.91	10.50	13.65
9. EPTC + PPG-124 + methyl bromide	3.0 + 0.38	0.23	0.33	3.86	22.64	12.48	9.91	7.41
10. EPTC + PPG-124 + methyl bromide	3.0 + 0.75	0.15	0.11	0.38	22.98	13.25	5.75	5.65
11. EPTC + R-33865 + methyl bromide	3.0 + 0.5	0.01	0.01	0.01	1.48	2.51	2.15	1.38
12. PPG-124	1.5	6.92	19.35	20.30	25.08	34.78	33.98	21.48
13. methyl bromide		4.20	14.84	26.00	34.90	33.29	30.19	19.94
14. Check	-	9.93	21.59	19.01	38.85	32.13	34.23	19.09
	$LSD_{.05}$	1.16	4.51	5.63	6.32	10.40	9.40	8.60
	CV (%)	44.9	44.6	32.9	15.8	32.0	33.4	45.3

[a]Methyl bromide applied at 3 lbs/plot

Selective elimination of foxtail barley from grass stands in western Wyoming. Simnacher, Ralph; Dr. Harold Alley, and Leslie Burrough. This study was conducted to see if foxtail barley, Hordeum jubatum, could be taken out of grass pastures and hay meadows where its presence seriously deteriorates the quality and production desired for livestock operations. Pronamide, metribuzin, terbacil, and hexazinone were applied to plots one square rod in size by conventional knapsack spray equipment with boom attached. Teejet 8004 nozzles were employed putting out 40 gallons per acre at 20 psi. Plots were located in Sweetwater and Sublette Counties. Time of applications were December 1979 and April 1980. Soils at the time were frozen or semi-frozen and plants were dormant. Temperatures at time of application were 28 F. to 38 F. Winds ranged from 0 to 7 miles per hour. Soil textures ranged from clay loam, to sandy loam, and loamy sand.

Both spring and fall plots yielded positive results. Since it is desirable to have natural precipitation carry the herbicides into the soil, fall application may give more consistent results. Spring trials with pronamide demonstrated from 82-100% control of foxtail while not taking out desirable grasses. The 1.0 rate of pronamide in Sublette County showed slight phytotoxicity to some grass species resulting in a 10% yield reduction. In Sweetwater County, fall trials showed from 30 to 40% grass reduction at the 1.0 rate. The lower rates of pronamide left the existing stands of grasses in good condition. The fall-spring trials with pronamide, metribuzin, hexazinone, and terbacil in Sublette County showed 70% to 80% control of foxtail barley except for the lowest rate of metribuzin. Metribuzin showed the most variability in results. Although hexazinone and terbacil produced good foxtail control they both were too severe on beneficial grass species to be desirable.

The ultimate cure for foxtail barley problems will have to involve irrigations management in conjunction with the establishment of desirable grass species that can out compete the pest. Herbicides can only act as a short term cure to obtain immediate changes in the composition of grass stands to foster the spread of better species. Garrison creeping meadow foxtail grass has shown promise in crowding out foxtail barley. It is a good quality feed.

Uninjured grass species included the following: baltic rush, Hall's rush, timothy, arrow grass, common meadow foxtail, alkali Sacton, quack grass, and brome grass.

Effect of hexazinone, terbacil, metribuzin and pronamide on foxtail barley

Chemical	Rate Active	% Control	Average	Remarks
hexazinone	0.25	70-85-85	80	Variable injury noted
hexazinone	0.50	80-100-100	93	Took out grass
hexazinone	0.75	90-100-100	97	" " " "
hexazinone	1.00	99-100-100	99	Bare
terbacil	0.50	75-100-95	90	Some injury noted other grass species
terbacil	1.50	95-98-99	96	Took out grass
terbacil	1.50	95-99-99	98	" " " "
metribuzin	0.25	20-10-10	13	Other plant species hurt
metribuzin	0.75	90-95-95	93	Took out Sporobulus-didn't hurt Timothy
metribuzin	1.00	90-95-98	94	Other grasses injured Didn't hurt Timothy
pronamide	0.25	95-80-70	82	Other grasses O.K.
pronamide	0.50	99-98-98	98	Other grasses not injured
pronamide	0.75	100-98-99	99	Other grasses not injured
pronamide	1.00	100-100-100	100	Grass OK slight production loss

[1]Grass - Alkali Sacaton - some scotch timothy

[2]Some variation in replications on severity of chemical injury to grasses.

Herbicide screening trial in chick peas. Handly, J. V., G. A. Lee, D. L. Auld, D. C. Thill. This study was established at Moscow, Idaho to evaluate the use of 8 herbicides for use in chick peas. Herbicides were applied with a knapsack sprayer equipped with a 3 nozzle boom calibrated to deliver 378 l/ha. Preplant treatments were applied on May 1, 1980 and incorporated twice with a flextine harrow traveling 6.6 km/hr set 2.54 cm deep. Climatic conditions prevailing were clear skies, wind 3 km/hr, air temperature 27 C, relative humidity 46%, and soil moisture moderate with a temperature of 18 C at 10 cm. Seeding was done on May 5 and preemergence treatments were applied on May 7. Climatic conditions were overcast skies, wind 1.6 km/hr, air temperature 9 C, relative humidity 93%, and soil moisture high with a temperature of 10 C at 10 cm. Post treatments were applied on June 19, climatic conditions were clear skies, wind 5 km/hr, air temperature 23 C, relative humidity 68%, and soil moisture moderate with a temperature of 17 C at 12 cm. The crop and weeds were 12 and 10 cm tall respectively. The design was a randomized complete block with 3 replications. Plot size was 9.1 m by 3 m. Visual evaluations were taken on July 7, 1980. Plots were harvested with a Hege plot combine.

Significant stand and vigor reductions were seen in plots treated with MCPA. Applications of dinoseb at 10 kg ai/ha preemergence surface, dinoseb at 10 kg ai/ha preemergence surface followed by dinoseb at 2.24 kg ai/ha post, and a tank mix of metribuzin at 0.56 kg ai/ha with triallate at 1.4 kg ai/ha preplant incorporated resulted in complete control of the weed species present. The three highest yields were also obtained from these plots. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Chick Pea Screening Trial at Moscow, Idaho

Treatment	Rate Kg a.i./Ha	Type of Application	Crop SR[1]	Crop VR[2]	Percent Control Mayweed	Percent Control Lambs-quarter	Percent Control Field Pennycress	Yield kg/ha
check	-	-	0	0	0	0	0	417c
trifluralin	.56	PPI	8b	10b	0b	42bc	0b	594bc
profluralin	.56	PPI	5b	12b	10b	0c	0b	919bc
dinoseb	10	PES	3b	0b	100a	100a	100a	3205a
dinoseb/dinoseb	10/2.24	PES/Post	22b	12b	100a	100a	100a	2599ab
metribuzin + triallate	.56 + 1.4	PPI	2b	5b	100a	100a	100a	3505a
diclofop methyl	.84	Post	10b	7b	0b	0c	0b	735bc
trifluralin + triallate	.56 + 1.4	PPI	20b	7b	23b	57ab	27b	853bc
MCPA	.42	Post	72a	55a	33b	100a	90a	77c

[1] Stand reduction

[2] Vigor reduction

[3] Means within a column followed by the same letter are not significantly different at the .05 level.

Annual weed control in green peas using metribuzin. Rydrych, D.J. Broadleaf weed control is often erratic in green peas when treatments are applied preemergence to weed growth. Metribuzin has not given consistent results when applied postemergence for annual broadleaf control in green peas. A trial was established at Pendleton in 1980. Metribuzin and herbicide combinations with trifluralin, ethalfluralin, profluralin, propham, and pendimethalin were compared in a preplant soil incorporated field trial. Preplant sprays were soil incorporated to a depth of 3 inches with a flextine harrow and green peas were seeded two days later. Visual evaluations were taken in May and the results are summarized in the table. No yield data was taken.

Metribuzin was very effective preplant incorporated on the broadleaf weeds and seemed to broaden the weed spectrum when combined with other herbicides. Trifluralin, pendimethalin, profluralin, ethalfluralin, and propham are all very weak on the mustard weed family. The addition of metribuzin to these herbicides completely controlled tumble mustard in this trial.

The results of this study showed that metribuzin could be soil incorporated and still give good broadleaf weed control with good crop safety. The combination of metribuzin with the other herbicides corrected the poor mustard control. Metribuzin applied postemergence also gave good weed control in the wet season of 1980, but it is usually erratic when used in this manner. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Annual weed control in green peas using metribuzin at Pendleton, Oregon--1980

Treatment1/	Method PPI or Post	Rate lb/A	Percent broadleaf weed control2/ L	RT	TM	Crop Injury %
metribuzin	PPI	.33	100	85	100	0
metribuzin	PPI	.50	100	90	100	3
trifluralin	PPI	.75	99	80	36	0
pendimethalin	PPI	.75	99	50	40	0
profluralin	PPI	.75	99	84	50	0
ethalfluralin	PPI	.75	99	97	30	0
propham	PPI	3.00	40	30	30	0
metribuzin + trifluralin	PPI	.25 + .50	100	90	100	0
metribuzin + pendimethalin	PPI	.25 + .50	100	80	100	0
metribuzin + profluralin	PPI	.25 + .50	98	70	100	0
metribuzin + ethalfluralin	PPI	.25 + .50	100	99	100	2
metribuzin + propham	PPI	.25 + 1.50	100	95	100	0
metribuzin	Post	.33	100	95	100	0
check	----	---	0	0	0	0

1/ All treatments applied preplant incorporated except those indicated postemergence.

2/ Abbreviations: L = lambsquarters; RT = Russian thistle; TM = tumble mustard

Fall applied herbicides for weed control in peppermint. Brenchley, R. G. and D. L. Zamora. A field study was conducted near Parma, Idaho to compare and evaluate fall applications of preemergence type herbicides for controlling winter and summer annual weeds in peppermint. Five year old peppermint was plowed, disced and recorrugated on November 7, 14, 18, 1979 respectively prior to herbicide applications.

Herbicide applications were made November 19, 1979. Environmental conditions at the time of application were as follows: air temperature 45 F, soil temperature 37 F, relative humidity 62%, wind NW 7 mph, cloud cover 0%, soil was moist to the surface. Soil type was a silty clay loam, pH 7.1, 1.1% organic matter. Plot size was 12 by 40 feet. Treatments were replicated four times in a randomized complete block design. Herbicides were applied using a compressed air, one-wheel, push-type sprayer equipped with a seven nozzle (8004) spray boom utilizing 26 psi pressure with a delivery rate of 27 gpa total spray solution. All herbicide treatments were applied to the soil surface without incorporation.

Rainfall amounts were 1.43 inches in October 1979, .83 inches in November 1979, 1.57 inches in December 1979, 1.78 inches in January 1980, 1.58 inches in February 1980, 1.51 inches in March 1980, .55 inches in April 1980, and 2.04 inches in May 1980.

Weeds present at time of evaluation on May 12, 1980 were common lambsquarters, flixweed, kochia, hairy nightshade, green foxtail and barnyardgrass.

Napropamide + terbacil, oryzalin + terbacil, and oryzalin + napropamide + terbacil gave good broad-spectrum weed control in peppermint. Most combination treatments containing terbacil as one of the components cause slight early season stunting of the peppermint; however, the late season evaluations indicate that the peppermint apparently grows out of this injury. Oxyfluorfen shows some promise in replacing terbacil; however, it needs additional help from either oryzalin or napropamide to adequately control green foxtail and barnyardgrass. (SW Idaho Research and Extension Center, University of Idaho 83660)

Fall Applied Herbicide Evaluations on Peppermint 1980

Treatments	Rate[1] lb/A	Peppermint % Stand	Peppermint % Stunt	Percent Weed Control[2] CLQ	FW	KO	HNS	GFT	BYG
Oryzalin	1.5	100	0	93	25	86	28	58	62
Oryzalin	3.0	100	0	90	30	93	48	79	75
Oxyfluorfen	1.0	100	0	80	90	77	63	59	55
Oxyfluorfen	2.0	100	0	93	91	73	68	67	71
Terbacil	2.0	97	8	91	96	92	83	71	73
Napropamide	4.0	100	0	86	88	97	64	65	63
Napropamide + Terbacil	3.0 + 1.5	100	6	93	95	89	83	82	81
Napropamide + Terbacil	4.0 + 2.0	100	11	96	98	93	81	85	84
Oxyfluorfen + Oryzalin	1.0 + 2.0	100	0	95	94	92	75	71	68
Oxyfluorfen + Napropamide	1.0 + 3.0	100	0	91	89	61	53	56	58
Oryzalin + Terbacil	1.5 + 1.0	100	0	94	95	97	87	81	88
Oryzalin + Terbacil	3.0 + 1.0	100	0	96	93	95	85	87	90
Oryzalin + Terbacil	1.5 + 1.5	98	3	91	94	95	78	83	81
Oryzalin + Terbacil	3.0 + 1.5	95	7	97	96	96	84	88	89
Oryzalin + Trifluralin	0.75 + 0.75	100	0	90	62	95	52	68	66
Oryzalin + Trifluralin	1.0 + 1.0	100	0	97	66	100	53	62	69
Oryzalin + Napropamide + Terbacil	2.0 + 2.0 + 1.0	100	0	95	98	95	82	83	83
Weedy Check		100	0	0	0	0	0	0	0

1/ Rate expressed as lb ai/A
2/ CLQ=common lambsquarters; FW=flixweed; KO=kochia; HNS=hairy nightshade; GFT=green foxtail; BYG=barnyardgrass

Common groundsel control in peppermint with asulam. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Asulam was applied as repeated applications on November 15, 1979 and May 19, 1980 at 0.5, 1.0, 2.0, and 4.0 lbs/A to peppermint at two locations in western Oregon. Location 1 was infested with common groundsel while location 2 was essentially weed-free.

Each trial was arranged in a Latin square with five replications and 8 by 25 ft plots.

Peppermint injury was evaluated on June 6 and July 8 at both locations. Common groundsel control was evaluated on January 21, June 6, and July 8. A 3-ft wide swath was harvested from the middle of each plot and the oil was distilled from air-dried foliage. Location 1 was harvested on August 4, 1980 and location 2 was harvested on July 18, 1980.

Crop injury ratings were negligible at asulam rates below 2 lbs/A, and by July 8 only the 4 lb/A rate at location 1 was causing visually detectable injury (Table 1). Common groundsel control at location 1 was more effective in the spring than in the fall with the two lowest rates.

Peppermint oil yields were greater with the 2 lb/A rate than in untreated control at both locations (Table 2), even though location 2 was weed-free. (Crop Science Department, Oregon State University, Corvallis 97331)

Table 1 Percent peppermint injury and common groundsel control in western Oregon with repeated applications of asulam

	Common groundsel			Peppermint			
	Evaluation Date						
	Jan 21	June 6	July 8	June 6		July 8	
Asulam	Location						
(lbs/A)	1	1	1	1	2	1	2
	(% injury or control)						
0.5/0.5	65	92	99	0	0	0	0
1.0/1.0	84	100	99	0	1	0	0
2.0/2.0	98	100	99	0	11	0	0
4.0/4.0	99	100	99	10	17	0	0
0	0	0	0	0	0	8	0

Table 2 Peppermint oil yield following repeated application of asulam in western Oregon

	Peppermint oil yield (lbs/A)		
Asulam	Location		
(lbs/A)	1	2	Avg
0.5/0.5	72.8	44.7	58.8
1.0/1.0	88.2	52.4	70.3
2.0/2.0	82.9	54.6	68.8
4.0/4.0	80.1	52.4	66.2
0	74.2	49.8	62.0
$LSD_{.05}$	8.2	3.9	
$LSD_{.01}$	11.6	5.5	

Common groundsel control in peppermint with bromoxynil. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Bromoxynil was applied as repeated applications in three peppermint trials. Trial locations 1 and 2 were in western Oregon and location 3 was in central Oregon. Location 3 was weed-free, while location 1 had a light infestation of common groundsel and location 2 had a heavy infestation.

Bromoxynil was applied on November 15, 1979 and May 13, 1980 at locations 1 and 2, and on December 6 and May 20, 1980 at location 3.

The trials were designed as Latin squares with five replications and 8 by 25 ft plots.

Common groundsel control was evaluated on June 6 at location 1 and on January 21, June 6, and July 8 at location 2. Peppermint injury was evaluated on June 6 at location 1 and 2 and on June 5 at location 3. At harvest, a 3-ft wide swath was cut from the center of each plot and the peppermint oil was distilled from the air-dried foliage. Location 1 was harvested on July 8, location 2 on August 4, and location 3 on August 7.

Common groundsel was controlled well by each application at all rates (Table 1). Since bromoxynil provides no residual control, no effect from the fall treatments could be seen when the spring treatments were applied.

Peppermint injury was moderate to severe, with less injury in the central Oregon trial (Table 2). However, by harvest, peppermint oil production with the three lowest rates was comparable to that in the untreated controls at all three locations. (Crop Science Department, Oregon State University, Corvallis 97331)

Table 1 Common groundsel control in western Oregon peppermint with repeated applications of bromoxynil

Bromoxynil (lbs/A)	Date evaluated: Jan 21	June 6		July 8
	Location: 2	1	2	2
	(% control)			
0.5/0.5	98	100	100	95
0.75/0.75	99	100	100	99
1.0/1.0	100	100	100	92
2.0/2.0	100	100	100	89
0	0	0	0	0

Table 2 Peppermint injury from repeated applications of bromoxynil

Bromoxynil (lbs/A)	Location 1	2	3	Avg
	(% injury)			
0.5/0.5	26	25	13	21
0.75/0.75	42	38	18	33
1.0/1.0	66	48	19	44
2.0/2.0	88	80	28	65
0	0	0	0	0

Table 3 Peppermint oil yield with repeated applications of bromoxynil

Bromoxynil (lbs/A)	Location 1	2	3	Avg
	(lbs/A)			
0.5/0.5	43.4	68.7	75.3	62.5
0.75/0.75	40.8	73.0	79.2	64.3
1.0/1.0	35.4	75.5	77.9	62.9
2.0/2.0	11.2	53.4	75.4	46.7
0	40.6	68.8	71.6	60.3
$LSD_{.05}$	9.9	10.9	n.s.	
$LSD_{.01}$	13.9	15.3	n.s.	

Kentucky bluegrass control in peppermint. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. BAS 9052 OH, RO 13-8895, and KK-80 were applied on April 19, 1980 to a dormant Todd's Mitcham peppermint stand in central Oregon to evaluate Kentucky bluegrass control. The trial was designed as a randomized complete block with two replications and 8 by 25 ft plots.

The trial was evaluated on May 6 and June 18, 1980 to determine peppermint injury and Kentucky bluegrass control. No injury was detected on the peppermint (see table below) with any treatment. BAS 9052 OH and RO 13-8895 were about equally effective on the bluegrass at comparable rates, but KK-80 was ineffective. (Crop Science Department, Oregon State University, Corvallis 97331)

Kentucky bluegrass control and peppermint injury with three experimental herbicides in central Oregon

Herbicide	Rate (lb/A)	Kentucky bluegrass control		Peppermint injury	
		Evaluation date			
		May 6	June 18	May 6	June 18
		(%)			
BAS 9052 OH	1.0	90	88	0	0
BAS 9052 OH	2.0	90	95	0	0
RO 13-8895	0.5	65	83	0	0
RO 13-8895	1.0	60	80	0	0
KK-80	1.0	0	0	0	0
KK-80	2.0	10	35	0	0
Check	0	0	0	0	0

Herbicide screening trial in winter rape. Handly, J. V., G. A. Lee, D. L. Auld, G. A. Murray, D. C. Thill. Two studies were established to evaluate tolerance of winter rape (Brassica napus, cultivar Dwarf Essex) to 10 selected herbicides. Treatments were applied with a knapsack sprayer fitted with a three nozzle boom calibrated to deliver 378 l/ha. Preplant treatments were incorporated twice with an offset disk set 7.6 cm deep, traveling at 5 km/hr. The first location was at Moscow, Idaho. Preplant treatments were applied on August 17, 1979 under clear skies. The air temperature was 29 C and the relative humidity was 52 percent. A breeze of 3 km/hr was coming from the west. Soil moisture was moderate and temperature was 27, and 20 C at 10 and 15 cm respectively. Post treatments at Moscow were applied on April 1, 1980 under overcast skies at an air temperature of 6 C. Rape plants at this time were 13 cm tall. The second location was at Craigmont, Idaho. Preplant treatments were applied on August 18, 1979. The sky was clear, wind was from the east at 3 km/hr and the air temperature was 27 C. Soil moisture was high and temperatures were 16 and 15 C at 10 and 15 cm respectively. Post treatments were applied on November 9, 1979 under overcast skies at 2 C. The relative humidity was 98% and the rape plants were 30 cm tall. Evaluations of weed control and crop vigor were not taken. Plots were harvested with a chain plot combine.

Tolerance of winter rape to the treatments applied appears to be high. Based upon yield results at the Craigmont location no treatment yielded significantly different from the check and only three were lower in yield. Check plots at Moscow yielded lower than any treatments studied indicating tolerance to the herbicides. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide screening trial in winter rape

Treatment	Rate Kg ai/ha	Type of Application	Yield Kg/Ha Moscow	Yield Kg/Ha Craigmont
check	-	-	3376c[1]	2105a
trifluralin + triallate	0.56 + 1.4	PPI	3696bc	1993a
trifluralin + cycloate	0.56 + 2.24	PPI	4066a-c	2138a
dinitramine + triallate	0.56 + 1.4	PPI	4204a-c	2367a
dinitramine + cycloate	0.56 + 2.24	PPI	3984bc	2220a
diclofop methyl	1.12	PPI	3782bc	2295a
trifluralin + diclofop methyl	0.56 + 1.12	PPI	4353a-c	2621a
dinitramine + diclofop methyl	0.56 + 1.12	PPI	4974ab	2084a
ethalfluralin	1.12	PPI	4399a-c	2285a
profluralin	1.12	PPI	4620a-c	2404a
propham + PCMC	3.36	Post	4698a-c	2099a
napropamide	1.12	Post	5242ab	2310a
triallate + solution 32	1.4 + 19 liters	Post	5591a	2298a

1/ Means within a column followed by the same letter are not significantly different at the .05 level.

Postemergence herbicides for weed control in rapeseed. Smith, N.L. R.F. Norris, T.E. Kearney, C. Langston. Rapeseed would normally be grown in a rotation with cereals in California. This experiment was established to evaluate candidate herbicides for post emergence control of problem weeds that could be expected in a cereal rotation. A dryland site in Yolo County was selected and seeded with wild oats and black mustard December 6, 1979 just prior to drilling of the rape (cultivar Midas). Herbicides were applied January 28, 1980 utilizing a CO_2 sprayer calibrated to deliver 20 gpa. Three replications were employed with an individual plot size of 200 sq. ft. (10 by 20 ft.). Weeds and crop were in the 2 leaf stage at time of application.

The experiment was evaluated April 8 for weed control and crop stand reduction. Diclofop methyl and barban were effective only on wild oats. Dalapon, at the two highest rates, was providing good control of wild oats; some control of miners lettuce was also evident. Control of wild oat, groundsel and mustard was good with asulam, but crop stand was severely reduced. Benazolin was weak on wild oats and groundsel with the rape exhibiting severe stunting. (University of California Cooperative Extension, Davis, CA 95616)

Postemergence weed control in Rapeseed

Herbicide	Rate lb/A	Weed Control - 4/8/80 Wild Oats	Miners Lettuce	Chick-weed	Groundsel	Black Mustard	Crop Stand Reduction
diclofop methyl	1	9.7	0	0	0.3	0	0
diclofop methyl	2	9.8	0	0.3	0.7	0	0
barban	0.38	9.2	4.7	4.0	2.0	0	0.3
dalapon	1	5.7	1.0	1.0	1.0	0	0
dalapon	2	8.3	5.7	2.0	1.7	0	0.3
dalapon	4	9.2	7.3	3.7	2.7	0	0
nitrofen	1	0	1.7	1.7	3.3	0.7	0.3
nitrofen	2	5.0	3.7	2.7	3.0	0	0
asulam	1	7.7	0	2.3	9.3	8.3	8.7
asulam	2	9.8	0	1.7	9.0	9.6	9.3
benazolin	0.5	0	10.0	9.7	3.0	8.0	4.3*
benazolin	1	0	10.0	10.0	1.0	8.8	4.7*
benazolin + dalapon	1+2	4.2	9.7	8.8	0	8.7	2.7*
control		1.3	2.3	4.7	1.0	0	0.7

0 = no control or stand reduction
10 = 100% control
* = stunted

Preemergence weed control in rapeseed. Smith, N.L., R.F. Norris, T.E. Kearney, C. Langston. Rapeseed is being investigated as a possible alternative crop to cereals in some areas of California. A dryland site in western Yolo county was selected to evaluate various herbicides either preplant incorporated or preemergence surface applied for winter weed control. Preplant materials were applied utilizing a CO_2 sprayer calibrated to deliver 20 gal/A. December 6, 1979 and immediately incorporated with a large spike tooth harrow. The plot area was planted (cultivar Midas) in 7 inch drill rows. Preemergence herbicides were applied December 7 utilizing a spray volume of 30 gpa. Four replications were employed, individual plots measured 10 by 20 feet.

Evaluations of weed control and stand reduction were made March 12, 1980. Trifluralin gave the best average weed control without substantially reducing the crop stand, however it was weak on shepherdspurse and common groundsel. Incorporated and surface applications of pendamethalin exhibited good weed control (except common groundsel) but with a substantial reduction in crop stand. Similar results were experienced with oryzalin. Napropamide gave good control of chickweed, shepherdspurse and groundsel. Alachlor was weak on chickweed, groundsel and fiddleneck. The combination of nitrofen and napropamide gave excellent control of all weed species except fiddleneck, but with some reduction in crop stand. Crop yields were taken from the trifluralin plots only. Trifluralin at 0.75 lb ai/A increased yields almost threefold. Yields were less from the high rate indicating some phytoxicity to the crop. (University of California Cooperative Extension and Experiment Station, Davis, CA 95616 and Woodland, CA 95695).

Weed control in rapeseed

		Control 3/12/80						Crop	
Herbicide	Ai/A	Wild Oats	Miners Lettuce	Chick-weed	Shepherds-purse	Groundsel	Fiddle-neck	Stand Reduction	Yield lbs/A
Preplant incorporated									
trifluralin	0.75	9.8	9.0	9.8	1.8	1.3	10.0	0.3	1261
trifluralin	1.5	9.9	9.8	10.0	4.5	0.8	10.0	1.8	799
pendamethalin	0.75	8.6	9.0	10.0	3.0	1.5	5.5	0.8	
pendamethalin	1.5	9.4	9.9	10.0	8.8	2.5	10.0	5.0	
alachlor	1.5	2.8	1.5	2.3	3.0	2.0	1.5	1.3	
alachlor	3.0	4.3	2.8	1.8	3.0	2.3	1.8	2.0	
control	-	0.8	0.3	0.8	1.0	0.3	0.5	1.0	443
Preemergence surface									
napropamide	1	6.1	1.5	10.0	9.9	9.8	4.3	2.0	
napropamide	2	9.9	7.8	10.0	10.0	10.0	2.5	0.5	
nitrofen	4	8.2	10.0	3.0	10.0	2.5	1.5	2.5	
nitrofen	8	9.9	10.0	2.8	10.0	5.3	5.3	2.8	
pendamethalin	0.75	3.8	10.0	9.8	10.0	0.5	10.0	4.8	
pendamethalin	1.5	4.5	10.0	10.0	10.0	0.8	10.0	9.4	
oryzalin	1	7.5	9.3	10.0	10.0	6.8	10.0	4.0	
oryzalin	2	9.0	10.0	10.0	10.0	9.1	10.0	7.0	
ethofumesate	1.5	7.0	4.8	10.0	7.8	1.5	5.3	1.0*	
ethofumesate	3	9.7	9.5	10.0	10.0	1.5	1.8	0.8*	
alachlor	1.5	5.0	4.3	4.8	8.8	3.8	4.3	0.8	
alachlor	3	8.3	10.0	5.8	9.8	1.0	6.8	1.3	
nitrofen + napropamide	4+1	9.9	10.0	10.0	9.9	10.0	4.5	3.0	
control		0	0	0	2.5	0	2.5	1.0	

0 = no control or stand reduction
10 = 100% control

* = deformed plants

Weed control in safflower at Culdesac, Idaho. Handly, J. V., G. A. Lee, D. L. Auld, G. A. Murray, D. C. Thill. This study was established on April 15, 1980 to evaluate weed control and tolerance of safflower (var. S208) to 9 herbicides. All treatments were applied with a knapsack sprayer fitted with a three nozzle boom calibrated to deliver 378 l/ha. Preplant incorporated treatments were applied on April 15 under partly cloudy skies. The air temperature was 15 C and the wind was from the south at 5 km/hr. Relative humidity was 83 percent. Soil moisture was moderate and the soil temperature at 10 cm was 13 C. Incorporation was done with a rototiller set to incorporate 7.6 cm. The plots were seeded at a rate of 11.3 kg/ha on 17.8 cm centers and pre-emergence surface treatments were applied. Post emergent treatments were applied on May 30, 1980 under clear skies at an air temperature of 7 C. The crop was 20 cm tall and the weeds were approximately 15 cm tall. The design was a randomized complete block with 4 replications. The 9.1 m by 3 m plots encompassed four planted rows. Visual evaluations of crop vigor reduction and weed control were taken on July 9, 1980. Plots were harvested on September 25, 1980 with a Hege plot combine.

Crop vigor reduction was 14% with barban and 17% with oxyfluorfen both at .42 kg ai/ha. All other treatments resulted in low or no vigor reductions. Plots treated with EPTC resulted in excellent bedstraw control. Oxyfluorfen and tank mixes of trifluralin and desmedipham or phenmedipham resulted in marginal control of bedstraw. Mayweed was not controlled well with any of the treatments. The best control was 54% which was observed in plots treated with oxyfluorfen. Good control of lambsquarter and shepherdspurse resulted from all mixes of trifluralin and phenmedipham. Excellence of shepherdspurse was observed with oxyfluorfen. Profluralin, trifluralin, propham, barban, and napropamide resulted in poor or no control of the weed species present. The highest yield was from plots treated with EPTC although this was significantly higher than only oxyfluorfen. Uniformly high yields were due to favorable conditions for growth and lack of heavy competition from the weed species present. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Herbicide Screening Trial in Safflower
at Culdesac, Idaho, 1980

Treatment		Rate Kg ai/h	Crop Vigor reduction	% Control: Bed-straw	May-weed	Lambs-quarter	Shepherds-purse	Yield kg/ha
trifluralin + phenmedipham	PPI/Post	1.1 + .6	1b[1]	22b-d	20bc	97a	77a-d	2853ab
trifluralin + phenmedipham	PPI/Post	1.1 + .8	2b	15b-d	17bc	71ab	97a	2790ab
trifluralin + phenmedipham	PPI/Post	1.1 + 1.1	1b	51a-c	40ab	87a	85-ac	2938ab
trifluralin + desmedipham	PPI/Post	1.1 + .6	0b	35a-d	14bc	87a	5ef	3210a
trifluralin + desmedipham	PPI/Post	1.1 + .8	2b	58ab	5c	97a	32d-f	2928ab
trifluralin + desmedipham	PPI/Post	1.1 + 1.1	0b	52a-c	7c	45bc	42c-f	2687ab
trifluralin	PPI	1.1	1b	7cd	2c	36b-d	0f	2862ab
EPTC	PPI	3.3	2b	94a	7c	20c-d	35d-f	3240a
profluralin	PPI	1.1	0b	0d	0c	0d	0f	3025a
propham	PPI	4.4	1b	0d	0c	0d	20ef	3027a
barban	Post	.42	14b	0d	9c	0d	51b-e	2678ab
oxyfluorfen	PES	.42	17a	56ab	54a	25cd	94ab	2334b
napropamide	PPI	1.1	2b	0d	4c	0d	0f	2830ab
check	-	-	0	0	0	0	0	2712ab

1/ Means within a column followed by the same letter(s) are not significantly different at the .05 level.

Evaluation of herbicides and safeners for sorghum. Bell, C.E., D. Cudney and S. Gagnon. A field study was established at the Imperial Valley field station to evaluate various herbicides for sorghum. The purpose of the trial was to compare metolachlor, an acid analine with a short residual against triazine herbicides, such as atrazine and terbutryn, and combinations with longer residuals. A seed safener was also used to evaluate its ability to protect sorghum from injury by metolachlor. Metolachlor at 1.5 and 2.0 lb/A and metolachlor + atrazine at 2.7 lb/A were preplant incorporated to 3 inches. Metolachlor + terbutryn at 1.5 + 1.5 lb/A, atrazine at 1.2 lb/A, terbutryn at 1.5 and 2.5 lb/A were applied preemergence. Application was with a CO_2 pressure sprayer. Plots were 30 feet by two beds, replicated 3 times, with sorghum sown in two rows. Seed in one bed was treated with the safener, while no safener was applied to seed in the adjoining bed. Treatments and planting were on June 20, 1979.

Observations on July 5, 1979, indicated that the safener was successful in reducing phytotoxicity by metolachlor. Control of barnyardgrass was accomplished by all treatments, control of groundcherry was achieved by all treatments except metolachlor. Observations on August 8, 1979 revealed a greater difference between the safened and unsafened metolachlor treatments. Yield was significantly different for safened and unsafened treatments.

Evaluation of herbicides and safeners for sorghum

		July 5, 1979		P		August 8, 1979		V		YIELD	
Treatment	lb/A	BG	WG	T	U	BG	WG	T	U	T	U
Metolachlor	1.5	10	4.3	3	8	10	6	9.3	1.3	1599	421
Metolachlor	2.0	10	5.6	3.7	8.7	10	7.3	9.7	2.3	1678	297
Metolachlor + atrazine	2.7	10	9.3	2.7	8.3	10	10	7.7	2.7	1416	529
Metolachlor + terbutryn	1.5 + 1.5	10	10	2.3	8.3	10	10	6.7	3.0	1700	583
Atrazine	1.2	8.3	10	3.0	2.3	10	6	9.0	9.0	1649	1254
Terbutryn	1.5	10	9.3	3.7	4.7	10	10	9.3	9.3	1354	1457
Terbutryn	2.5	10	9.6	2.0	3.0	10	10	9.3	9.3	1348	1396
Check		0	0	0	1.3	1.0	0.7	10	8.3	1068	872

BG = Barnyardgrass, WG = Wrights groundcherry,

P = phytotoxicity 0 = no injury or control, 10 = all plants dead

V = vigor, 0 = no growth, 10 = most vigorous
T = treated with safener, U = untreated
Yield in grams based upon 15 feet in middle of each plot, average of three replications.

Preplant incorporated herbicides for weed control in grain sorghum, safened vs unsafened seed. Smith, N.L., R.F. Norris and J.T. Woods. In previous years it has been demonstrated that alachlor and metolachlor could be safely used on grain sorghum that had been treated with a safener (CGA 43089). This experiment was designed to compare CGA 43089 and MON 4606 (safeners) in the presence of eight preplant incorporated herbicides. Both safening compounds were coated on the seed at 0.125% w/w. A site on the Davis campus was selected and the herbicides were applied to preformed beds August 1, 1980 utilizing a CO_2 pressure sprayer calibrated to deliver 30 gal/A. Soil type was sandy loam with 1.2% O.M. and a pH of 7.5. Incorporation was 2 inches deep in dry soil utilizing a Marvin Rowmaster immediately following herbicide application. Three replications were employed with four beds per plot, 20 feet long. The experiment was planted August 7 at a depth of 1.5 inches. Two rows in each plot were planted with Funks 499, one treated with CGA 43089, one untreated. The other two rows were planted with Funks G 552, again one row contained seed treated with a safener, MON 4606. The experiment was furrow irrigated August 11.

Good control of barnyardgrass and redroot pigweed was observed September 2 from alachlor, metolachlor, MON 097 and EPTC. Propachlor, RE 28269 and SN 80786 were more active on barnyardgrass with PPG 844 more effective on pigweed. Both safeners markedly reduced injury from alachlor, metolachlor and MON 097 as indicated by stand counts and dry weight measurements on the grain sorghum. Injury from SN 80786 was also reduced by the addition of the safeners, however they had little effect on the toxicity of EPTC. Propachlor and RE 28269 did not affect either stand count or weight. Stand was reduced by PPG 844. (University of California Cooperative Extension, Davis, CA 95616).

Weed control in grain sorghum

		Weed Control 9/2/80		Crop stand counts[1/] 9/2/80				Crop dry weights (gms)[2/] 9/18/80			
		barnyard-grass	R.R. pigweed	CGA 43089		MON 4606		CGA 43089		MON 4606	
Herbicide	lb/A			+	-	+	-	+	-	+	-
alachlor	2	9.5	9.5	25.3	15.7	16.0	7.8	33.6	21.0	22.0	16.9
alachlor	4	10.0	9.2	18.2	4.7	19.7	1.2	23.9	10.7	27.8	5.4
alachlor	8	10.0	10.0	17.2	1.0	17.8	0	23.4	2.9	25.4	0
alachlor	16	10.0	10.0	13.0	0	12.5	0	16.6	0	19.7	0
metolachlor	2	10.0	10.0	19.7	7.8	16.8	3.0	24.8	8.4	23.9	14.8
metolachlor	4	10.0	10.0	20.7	1.2	19.0	0	25.6	1.7	30.5	0
metolachlor	8	10.0	10.0	18.2	0.2	11.3	1.2	23.4	0	20.5	4.8
metolachlor	16	10.0	10.0	14.2	0	15.5	0	26.2	0	33.2	0
MON 097	1	9.7	9.7	18.0	3.5	16.5	1.8	19.3	25.9	26.7	13.1
MON 097	2	10.0	10.0	23.7	3.3	19.7	1.2	40.0	7.9	29.7	5.6
MON 097	4	10.0	10.0	15.8	0.2	7.2	0.3	15.8	0	22.0	6.1
SN 80786	0.75	9.3	6.3	21.8	10.3	15.3	8.7	14.4	13.8	21.3	19.9
SN 80786	1.5	9.3	7.7	19.7	6.0	18.7	2.7	25.2	17.9	42.2	12.6
SN 80786	3	9.5	9.5	15.8	7.0	16.8	6.8	22.1	8.4	16.1	4.5
PPG 844	1	2.3	9.3	8.5	11.2	14.8	8.3	18.9	24.3	28.3	27.3
PPG 844	2	4.7	10.0	7.3	8.2	8.7	4.7	21.7	21.6	22.9	17.3
RE 28269	0.5	4.0	0.7	23.0	16.5	17.7	15.8	23.3	21.5	26.6	27.8
RE 28269	1	7.8	2.7	22.5	15.2	19.0	18.8	16.3	18.6	20.5	18.8
propachlor	4	8.7	5.7	26.8	20.3	19.0	13.0	23.8	18.1	27.4	19.1
propachlor	8	9.2	7.0	23.0	18.7	17.7	15.3	25.3	26.0	27.4	29.1
EPTC	3	9.9	10.0	0	0	0	0	0	0	0	0
EPTC	6	10.0	10.0	0	0	0	0	0	0	0	0
control	-	0	1.7	18.2	11.8	12.0	15.0	21.7	19.3	23.9	28.7

1/ Counts/meter of row. 2/ Dry wt. of 10 plants/plot

Comparison of various herbicides for weed control in soybeans. Bell, C.E., D. Cudney, D. Howell, G. Worker, H. Ford and R. Waegner. A field trial was initiated at the Imperial Valley field station to compare various herbicides for weed control in soybeans, a potential crop in the desert. The trial utilized nineteen herbicides and herbicide combinations compared to an untreated check. Plots were two 40 inch beds by 30 feet, replicated four times. Soybeans, Rillito variety, were seeded in two rows on each bed. Herbicide treatments were made preplant incorporated, preemergence and postemergence. Preplant incorporated treatments at 2½ inches, preemergent treatments and planting were done on June 20, 1979. Postemergent treatments were over the top on July 5, 1979. One bed of each plot was seeded to barnyardgrass, the other to lance-leaved groundcherry. Unfortunately, emergence and growth of the groundcherry was inadequate for good evaluation, however, a native population of Wrights groundcherry was present. Applications were with a CO_2 pressure sprayer.

Preplant incorporated treatments were of ethalfluralin, vernolate, profluralin + metribuzin, profluralin + chlorpropham, profluralin + bentazon, chlorpropham, diphenamid, metolachlor, naptalam + dinoseb and chloramben. Preemergence treatments were of DCPA, metribuzin and bifenox. Postemergence treatments were of acifluorfen, bentazon, diclofop, 2,4-DB and bentazon + diclofop.

Initial observations on July 6, 1979 indicated some phytotoxicity from vernolate and naptalam + dinoseb, no other treatments preplant incorporated or preemergence showed injury. Adequate control of groundcherry was evident with metolachlor, ethalfluralin and vernolate. Barnyardgrass control was accomplished by vernolate, profluralin, profluralin + metribuzin, profluralin + chlorpropham, profluralin + bentazon, metolachlor, naptalam + dinoseb and diphenamid.

Plots were rated again on July 18, 1979. Injury to the soybeans was severe from 2,4-DB and evident from bentazon, bentazon + diclofop and diclofop, all applied postemergence. Ratings on September 20, 1979, showed virtually no injury remaining from any treatment. Commercially acceptable control of groundcherry was evident by ethalfluralin, profluralin + metribuzin, chlorpropham, metolachlor and metribuzin preemergence or preplant incorporated, and by acifluorfen postemergence. Control of barnyardgrass was acceptable with ethalfluralin, vernolate, profluralin, profluralin + metribuzin, profluralin + chlorpropham, profluralin + bentazon, metolachlor, DCPA, metribuzin, diclofop and bentazon + diclofop. (University of California, Cooperative Extension, Courthouse, 939 Main, El Centro, Ca. 92243).

Herbicide ratings for weed control in Soybeans

		July 6, 1979			September 20, 1979			
Treatment	lb/A	BG	LG	P	BG	LG	P	timing
Ethalfluralin	1	9.2	8.8	0	10.0	7.8	0	PPI
Vernolate	3	9.5	7.8	2.5	7.8	6.3	0	PPI
profluralin	.75	9.0	1.5	1.0	8.8	5.3	0	PPI
profluralin + metribuzin	.75 + .5	9.2	4.8	0	9.5	8.8	0	PPI
profluralin + chlorpropham	.75 + 3	9.2	2.2	0	9.5	6.0	0	PPI
profluralin + bentazon	.75 + 1	8.8	2.0	0	9.0	6.5	0	PPI
chlorpropham	3	5.5	3.2	0	2.8	7.0	0	PPI
diphenamid	4	7.5	3.0	0	6.5	4.0	0	PPI
metolachlor	2	9.8	10	0	9.8	7.5	0	PPI
naptalam + dinoseb	4.5	8.2	5.5	2.5	3.5	5.3	0	PPI
chloramben	2	1.5	2.5	0	3.5	4.3	0	PPI
DCPA	10	3.5	2.2	0	7.3	6.3	0	PREE
metribuzin	.5	4.8	3.2	0	7.8	8.0	0	PREE
bifenox	1.5	0.5	1.2	0	5.3	5.8	0	PREE
acifluorfen	1	0.5	0	0	4.0	7.5	0	POST
bentazon	1	0.75	1.0	0	3.0	6.0	0	POST
diclofop	1.5	1.0	1.2	0	7.8	4.5	0	POST
2,4-DB	.5	3.0	1.2	0	2.0	5.3	0.5	POST
bentazon + diclofop	1 + 1.5	2.0	1.0	0	7.8	5.3	0	POST
check		0.0	1.0	0	3.5	2.0	0	

BG = Barnyardgrass, LG = lance-leaved and wrights groundcherry,

P = Phytotoxicity 0 = no control or injury, 10 = all plants dead

Evaluation of herbicides for annual weed control in sugar beets. Callihan, R. H. and P. W. Leino. Several herbicides and herbicide combinations were evaluated for efficacy upon annual weeds in sugar beets.

Herbicides were applied on a dry-surfaced Declo loam (1.2 % OM) on May 2, 1980 to preemergent D-2 variety sugar beets. The air temperature was 43.5 F. A tractor-mounted sprayer equipped with eight 8005 nozzles operating at 25 psi at 3 mph, calibrated to deliver 35 gpa was used for the application.

Excellent pigweed (*Amaranthus retroflexus*) control was observed in all treatments. SN80786 at the 1 lb ai/A rate was ineffective in controlling lambsquarter (*Chenopodium album*). Nortron alone and Antor "A" at the 4 lb ai/A provided somewhat more control on lambsquarter. The rest of the treatments provided adequate to excellent control of lambsquarter. All treatments controlled green foxtail (*Setaria viridis*) well.

Stunting of sugar beets occurred with 3 lb ai/A Pyramin and with the Nortron-Pyramin combinations in which Pyramin above the 1.5 lb ai/A rate. Generally the acid amides resulted in visual signs of beet shoot stunting with Lasso preventing emergence. Yield from plots treated with Lasso was naturally greatly depressed.

The Nortron-Pyramin combination at its highest rate (2 lb ai/A + 3 lb ai/A) also showed a depressed yield. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Annual weed control herbicides in sugar beets

Treat- ment No.	Herbicide	Lb. ai/A	Weed response[1] Amre	Chal	Sevi	Beet response: Beet stunt- ing	No.[2] of roots	Root[2] yield
1	Check	-	17	20	49	0	66	153
2	Antor A	4.0	1	13	1	4	65	147
3	Antor B	4.0	1	8	0	2	66	148
4	Check		15	23	35	0	60	145
5	Antor B + nortron	4.0 + 1.5	0	3	0	17	62	142
6	Nortron + pyramin	1.5 + 1.5	0	2	1	6	61	137
7	Nortron + pyramin	1.5 + 2.25	0	0	0	23	66	146
8	Nortron + pyramin	2.0 + 3.0	0	0	0	63	55	133
9	Nortron + pyramin	2 + 1.5	0	2	0	10	62	145
10	Nortron	1.5	0	15	2	5	65	145
11	Nortron	2.0	0	11	0	10	69	151
12	Pyramin	2.25	1	0	6	13	60	136
13	Pyramin	3.0	0	0	5	24	57	147
14	SN80786	1.0	1	22	3	10	61	144
15	SN80786	2.0	0	6	1	46	56	135
16	Lasso	2.5	0	1	0	96	60	125
17	Lasso	5.0	0	0	0	99	19	45
18	Dual	2.5	0	5	0	24	61	146
19	Dual	5.0	0	1	0	53	61	137
20	Antor A + Nortron	4.0 + 1.5	0	3	0	18	59	139
LSD 5%			2.8	10.9	8.8	19.4	8.0	19.4

1/ Amre = Amaranthus retroflexus; Chal = Chenopodium album; Sevi = Setaria viridis

2/ Harvested area = 44 inches by 30 feet

Selective postemergence control of quackgrass in sugarbeets. Callihan, R. H. and P. W. Leino. R0138895 and BAS 9052 were evaluated for postemergence control of quackgrass (Agropyron repens) in sugarbeets.

The initial application was made on May 28, 1980 to sugarbeets in the two-leaf stage in a field heavily infested with quackgrass in the three to four leaf stage. The air temperature was 44 F and the wet Declo loam soil surface was 41.5 F. When the quackgrass was in the seven to eight leaf stage on June 6, the second application of the split application treatments was made.

Both applications were made with a tractor-mounted sprayer equipped with eight 8005 nozzles operating at 25 psi, at 3 mph calibrated to deliver 35 gpa by compressed air. A randomized complete block design was used with plots measuring 12 feet by 40 feet replicated four times.

Higher rates of R0138895 resulted in up to 90% control of above-ground foliage. BAS 9052 achieved up to 94% control, where again the higher rates were more effective.

The split applications of each chemical seemed less effective at a given rate, possibly due to the short interval of time between applications which did not allow adequate regrowth of surviving shoots to accept the second application. Neither chemical caused visible damage to the crop.

Statistical differences in yield appeared to be related to herbicide efficacy and dose.

Rhizomes were gathered from plots on June 13 to assess translocated effects by evaluating current-season rhizome bud sprouting in the growth chambers. Fifty buds per plot were placed on moist media, and sprouts were counted after two weeks in a dark growth chamber. Bud inhibition appeared to be related to field observations of control. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Response of quackgrass and sugarbeets to herbicides

Treatment No.	Herbicide	Rate ai/A First	Rate ai/A Second	Quackgrass control (%) June13	Quackgrass control (%) Aug 8	Beet stunting (%)[1/]	No.of beets roots/plot[2/]	Beet yield per plot[2/]	Sprouted buds(5)[3/]
1	RO138895	0.0		0	0	0	43	83	24
2	RO138895	0.5		14	16	0	42	81	13
3	RO138895	0.75		18	39	0	47	96	2
4	RO138895	1.0		20	64	0	50	103	6
5	RO138895	0.5	+ 0.5	38	65	0	46	100	7
6	RO138895	0.75	+ 0.75	44	90	1	53	99	4
7	BAS 9052	0.0		0	0	0	47	92	46
8	BAS 9052	0.5		39	56	0	46	102	10
9	BAS 9052	0.75		54	78	0	49	106	8
10	BAS 9052	1.0		65	91	0	53	131	2
11	BAS 9052	0.5	+ 0.5	54	75	1	51	106	13
12	BAS 9052	1.75	+ 1.75	61	94	1	51	104	1
LSD 5%				7	23	1.2	9.4	29	

1/ Estimated percent chlorotic and necrotic leaf tissue.

2/ Plot size = 44 inches by 30 feet.

3/ Percent of sprouted nodes on July, 1 1980 from rhizomes gathered June 13, 1980.

Tolerance of sugarbeets to selective postemergent grass herbicides. Callihan, R. H. and P. W. Leino. Herbicides were applied in four replicates on June 10, 1980 to sugar beets in the four to six true-leaf stage growing on a dry surfaced Declo loam. The temperature on the soil surface was 100 F and the air temperature was 76 F. The second application of the split application treatments was applied two weeks later with the soil surface temperature 106 F and the air temperature 79 F. Sugar beets were in the 10 to 12 true-leaf stage. The first application was made with a tractor-mounted broadcast equipped with eight 8005 nozzles operating at 25 psi at 3 mph, calibrated to deliver 35 gpa. The second application used a bicycle sprayer with the same boom and with the same operating specifications. Weeds were removed by mechanical cultivation and hand weeding.

Beet plants were observed during the season for symptoms of phytotoxicity. Roots were harvested, counted and weighed in October.

RO138895 at one lb ai/A showed necrotic spot lesions on the leaves exposed to the spray. Application of .75 lb ai/A of RO138895 resulted in detectable lesions on some plants. No other effects were noted during the growing season. Treatments were not found to affect root yield. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

The effect of BAS 9052 and RO138895 upon number and yield of sugar beets (1980)

Treat-ment No.	Herbicide	Form	Rate (ai/A) June 10	Rate (ai/A) June 24	No. of roots	Yield of roots (lb)[1/]
1	RO138895	3E	0.0	0.0	61 ab[2/]	153
2	RO138895	3E	0.5	0.0	62 ab	156
3	RO138895	3E	0.75	0.0	62 ab	161
4	RO138895	3E	1.0	0.0	61 b	150
5	RO138895	3E	0.5	0.5	60 b	157
6	RO13-895	3E	0.75	0.75	68 a	150
7	BAS 9052	1.53	0.0	0.0	64 ab	156
8	BAS 9052	1.53	0.5	0.5	65 ab	147
9	BAS 9052	1.53	0.75	0.0	62 ab	151
10	BAS 9052	1.53	1.0	0.0	62 ab	152
11	BAS 9052	1.53	0.5	0.5	63 ab	163
12	BAS 9052	1.53	0.75	0.75	62 ab	154

1/ Plot size: 44 inches by 30 feet.

2/ Means within a column followed by the same letter are not significantly different at the 5% level of probability based on Duncan's Multiple Range Test.

Postemergence summer annual grass control in sugarbeets. Norris, R. F., M. Murray, and R. A. Lardelli. This trial was established to further evaluate new grass herbicides for their efficacy under postemergence conditions. The test plot was initiated in a commercial sugarbeet field in the Sacramento valley near Colusa, California. The field was heavily infested with barnyardgrass. All herbicides were applied on June 6, 1980 using a CO_2 backpack handsprayer equipped with a two nozzle boom calibrated to deliver 40 gal/A. Plots were arranged in a randomized complete block design with three replications. Plot size was two beds by 15 ft. The last irrigation conducted prior to herbicide application was on May 20, 1980. No further irrigations were applied until the first week in July. The stages of growth at application were for sugarbeets; 2- to 4-leaves, and for barnyardgrass; 0.5 to 1.0 inches tall.

Sugarbeet tolerance to the herbicides was good for all treatments. The vigor of the untreated checks was depressed by 20 to 30% in comparison with treatments with effective barnyardgrass control; this was attributed to the competition from the barnyardgrass. Excellent control of barnyardgrass was obtained with BAS-9052 OH or with Ro-138895. Phenmedipham applied to the young grass seedlings in this trial also provided partial control. There was no antagonism of the grass killing herbicides when mixed with phenmedipham in this trial. Diclofop-methyl showed only slight activity; this may have been due to the low soil moisture conditions in this experiment. (Botany Department, University of California, Davis, CA 95616, and Cooperative Extension, Colusa, CA 95932).

Postemergence summer annual grass control in sugarbeets.

Herbicide(s)	Rate, lb/A	Sugarbeet vigor	Barnyardgrass control
phenmedipham	1.0	7.0	6.8
phenmedipham	1.5	6.8	5.5
diclofop-methyl	1.0	7.7	1.7
diclofop-methyl	2.0	7.5	4.3
phenmedipham + diclofop-methyl	1.0 + 1.0	5.3	7.3
phenmedipham + diclofop-methyl	1.0 + 2.0	6.5	7.0
ethofumesate + phenmedipham	1.0 + 0.8	6.7	6.8
ethofumesate + phenmedipham	1.5 + 1.0	6.5	7.0
BAS-9052 OH[1/]	0.75	7.6	10.0
BAS-9052 OH	1.5	9.5	10.0
phenmedipham + BAS-9052 OH	1.0 + 0.375	7.0	9.7
phenmedipham + BAS-9052 OH	1.0 + 0.73	6.7	10.0
phenmedipham + BAS-9052 OH	1.0 + 1.5	7.8	10.0
Ro-138895[2/]	0.375	8.5	10.0
Ro-138895	0.75	8.0	10.0
Ro-138895	1.5	7.7	10.0
phenmedipham + Ro-138895	1.0 + 0.375	7.3	9.5
phenmedipham + Ro-138895	1.0 + 0.75	7.3	9.2
phenmedipham + Ro-138895	1.0 + 1.5	6.0	9.7
untreated check	-	6.3	0.0

1/ BAS-9052 OH used with 0.25 gal/A of 'Pacewet'.
2/ Ro-138895 used with 0.25% vol/vol of ACR 4008.
Evaulations made June 26, 1980. Vigor: 10 = normal, 0 = dead
Control: 10 = complete kill, 0 = no control

Evaluation of postemergence herbicide treatments for weed control in spring-sown sugarbeets. Norris, R. F., J. P. Orr, and R. A. Lardelli. No single herbicide applied postemergence controls all the broadleaf and grass weeds which are common in many spring-sown sugarbeet fields in the Sacramento valley of California. The purpose of this test was to evaluate experimental and registered herbicides for their compatibility and efficacy as single and combination treatments. A sugarbeet field with a severe barnyardgrass problem was selected at Franklin road, near Sacramento. Herbicides were applied postemergence when the sugarbeets were at the 2- to 4-leaf stage of growth. The grasses were from 1.0 to 6.0 inches tall. All treatments were applied on May 12, 1980 with a CO_2 backpack handsprayer calibrated to deliver 40 gal/A of water. Plots consisted of two beds by 15 ft arranged in a complete randomized block design with three replications. The field was dry at treatment and was not irrigated for a further two weeks.

None of the treatments caused injury to the sugarbeets. The low vigor in the untreated check was attributed to the competition by the barnyardgrass. The control of barnyardgrass was excellent with either BAS-9052 OH or Ro-138895 when applied at 0.75 or 1.5 lb/A. Mixtures of BAS-9052 OH and phenmedipham provided no advantage for grass or broadleaf control; grass control later in the season appeared to be decreased by the mixture. The mixture of phenmedipham and Ro-138895 was antagonistic; grass control was much lower when the two herbicides were mixed than when Ro-138895 was applied alone. Diclofop did not provide adequate grass control under the low soil moisture conditions of this experiment; its activity was also antagonized by phenmedipham. The smartweed was variable, but the mixture of phenmedipham plus ethofumesate gave the best control; grass control was poor. (Botany Department, University of California, Davis, CA 95616, and Cooperative Extension, Sacramento, CA 95827).

Postemergence barnyardgrass control in spring-sown sugarbeets.

Herbicide(s)	Rate lb/A	Sugarbeet vigor 5/23	Sugarbeet vigor 6/3	Weed control barnyardgrass 5/23	Weed control barnyardgrass 6/3	Weed control barnyardgrass 8/14	SW[1/] 6/3
phenmedipham	1.0	8.0	7.7	0.7	0.3	0.0	8.7
phenmedipham	1.5	8.2	7.3	0.7	0.0	0.0	7.3
diclofop-methyl	1.0	7.3	6.3	1.0	0.0	0.0	8.0
diclofop-methyl	2.0	7.5	7.3	4.0	7.5	4.0	4.3
phenmedipham + diclofop-methyl	1.0 + 1.0	7.0	6.7	2.3	2.0	0.3	6.3
phenmedipham + diclofop-methyl	1.0 + 2.0	8.0	7.3	2.0	1.7	0.3	6.7
ethofumesate + phenmedipham	1.0 + 0.8	9.0	7.7	0.0	0.0	0.0	9.8
ethofumesate(FL) + phenmedipham	1.0 + 0.8	7.7	6.2	0.0	0.0	0.0	9.5
ethofumesate + phenmedipham	1.5 + 1.0	7.8	6.3	0.7	1.7	0.3	9.3
ethofumesate(FL) + phenmedipham	1.5 + 1.0	7.7	6.3	0.3	0.3	0.0	7.7
BAS-9052 OH[2/]	0.375	8.0	7.0	4.7	7.0	4.0	4.0
BAS-9052 OH	0.75	7.7	8.0	7.2	9.7	9.4	2.0
BAS-9052 OH	1.5	9.5	9.8	8.2	10.0	9.8	2.3
phenmedipham + BAS-9052 OH	1.0 + 0.375	8.0	8.5	6.7	6.2	2.7	6.3
phenmedipham + BAS-9052 OH	1.0 + 0.75	8.7	9.7	7.2	9.0	3.2	4.0
phenmedipham + BAS-9052 OH	1.0 + 1.5	9.7	9.7	7.2	9.8	4.7	7.0
Ro-138895[3/]	0.375	7.0	6.8	5.8	9.5	9.1	2.0
Ro-138895	0.75	8.3	8.3	6.0	10.0	9.4	3.0
Ro-138895	1.5	8.0	9.0	6.7	10.0	9.6	1.0
phenmedipham + Ro-138895	1.0 + 0.375	7.3	7.0	2.3	0.7	0.0	5.0
phenmedipham + Ro-138895	1.0 + 0.75	6.7	7.3	3.2	3.0	1.0	6.3
phenmedipham + Ro-138895	1.0 + 1.5	7.3	7.7	4.3	4.3	1.7	7.0
untreated check	-	6.7	7.0	0.0	0.0	0.0	4.0

1/ SW = pale smartweed.
2/ BAS-9052 OH used with 0.25 gal/A of 'Pacewet'.
3/ Ro-138895 used with 0.25% vol/vol of ACR 4008.
Evaluations: vigor: 10 = normal, 0 = dead
control: 10 = complete kill, 0 = no control.

Evaluations of split-applications of postemergence herbicide mixtures on sugarbeets. Schild, L. D. and E. E. Schweizer. Herbicidal activity of mixtures of BAS 9052, ethofumesate, phenmedipham, desmedipham, and diclofop were compared for selective control of kochia, common lambsquarters, redroot pigweed, and green and yellow foxtail, when applied once or twice in sugarbeets.

On April 17, 1980 weed seed were applied at 12.9 lb/A on a 10-inch band and incorporated into a dry, cloddy seed bed. Pelleted 'GW Mono-Hy D2' sugarbeet seed were planted on April 18 at three seeds per foot of row. Herbicide treatments were replicated four times in a randomized complete block design. Herbicides were applied broadcast at 30 gpa initially on May 28 when sugarbeets had 4 true leaves, with the second applications being made on June 3. Weed stages of growth initially were: kochia 1/2 to 1-1/2 inches in height, 1/2 to 1-3/4 inches in diameter, with 50% of the plants beginning to elongate; redroot pigweed had 4 to 5 true leaves, 1/2 to 1 inch in diameter (prostrate); common lambsquarters had 4 to 8 true leaves, 1/2 to 1 inch in height; and foxtail species had 4 to 5 leaves with a height of 3/4 to 1-3/4 inches.

The response of sugarbeets and weeds to the herbicides was determined by counting the number of weeds and sugarbeets present in two quadrats, each 4 inches by 10 ft, per treatment from each replication. The stand of weeds and sugarbeets in the treated plots has been expressed as a percentage of those weeds present in the untreated plots. Plant stands were counted on June 19, and sugarbeet suppression was rated on July 1.

Sugarbeet suppression was less than 10% for all treatments (see table). Applications of diclofop + ethofumesate + phenmedipham + desmedipham at 1 + 1 + 0.5 + 0.5 lb ai/A markedly reduced sugarbeet stands (19 to 24%).

Two applications of herbicide mixtures were 15 to 42% more effective on reducing the average stand of weeds than single applications. Complete weed control was observed with two applications of BAS 9052 + ethofumesate + desmedipham at 0.5 + 1 + 1 lb ai/A. This treatment controlled weeds as well as two applications of either ethofumesate + phenmedipham + desmedipham at 1.5 + 0.375 + 0.375 lb ai/A or diclofop + desmedipham + phenmedipham at 1 + 0.5 + 0.5 lb ai/A.

Single applications of all mixtures were inadequate for controlling kochia (6 to 50%). Two applications increased control of kochia by 39 to 80%. In some cases two applications were not beneficial for controlling common lambsquarters, redroot pigweed, and green and yellow foxtail when these species were compared independently.

This preliminary study suggests that the mixture of BAS 9052 + ethofumesate + desmedipham warrants further evaluation in sugarbeets. (Western Region, Science and Education Administration, U.S. Department of Agriculture, Fort Collins, Colorado 80523).

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

Treatments			Sugarbeets		Weed control (stand reduction)[c]				
Herbicides[a]	No. of applications[b]	Rate	Stand reduction[c]	Visual[d] rating	KO[e]	LQ	RPW	SE	Avg
		(lb ai/A)	(%)						
BAS + Etho + Phen	1	0.5 + 1 + 1	5	5	31	100	38	98	67
BAS + Etho + Phen	2	0.5 + 1 + 1	6	5	98	100	85	100	96
BAS + Etho + Des	1	0.5 + 1 + 1	0	5	20	93	100	99	78
BAS + Etho + Des	2	0.5 + 1 + 1	2	3	100	100	100	100	100
BAS + Etho + Phen + Des	1	0.5 + 1 + 0.5 + 0.5	1	4	39	99	98	100	84
BAS + Etho + Phen + Des	2	0.5 + 1 + 0.5 + 0.5	17	6	97	100	100	100	99
Dic + Etho + Phen	1	1 + 1 + 1	2	5	38	96	53	97	71
Dic + Etho + Phen	2	1 + 1 + 1	19	9	99	100	98	99	99
Dic + Etho + Des	1	1 + 1 + 1	10	5	30	90	98	93	78
Dic + Etho + Des	2	1 + 1 + 1	13	8	99	100	100	99	99
Dic + Etho + Phen + Des	1	1 + 1 + 0.5 + 0.5	24	1	50	97	94	97	85
Dic + Etho + Phen + Des	2	1 + 1 + 0.5 + 0.5	19	8	100	100	100	99	100
Dic + Phen + Des	1	1 + 0.375 + 0.375	1	5	10	55	61	88	54
Dic + Phen + Des	2	1 + 0.375 + 0.375	4	3	57	100	99	99	89
Dic + Phen + Des	1	1 + 0.5 + 0.5	3	4	14	61	84	96	64
Dic + Phen + Des	2	1 + 0.5 + 0.5	3	3	91	100	100	100	98
Etho + Phen + Des	1	1 + 0.25 + 0.25	2	9	6	91	91	39	57
Etho + Phen + Des	2	1 + 0.25 + 0.25	3	1	81	99	100	90	93
Etho + Phen + Des	1	1.5 + 0.375 + 0.375	3	6	35	100	98	72	76
Etho + Phen + Des	2	1.5 + 0.375 + 0.375	4	4	100	100	100	96	99
Phen + Des	1	0.375 + 0.375	6	6	24	62	70	21	44
Phen + Des	2	0.375 + 0.375	1	1	63	100	91	74	82
Phen + Des	1	0.5 + 0.5	3	4	10	66	82	26	46
Phen + Des	2	0.5 + 0.5	1	0	75	100	97	79	88
Check - weeds/ft^2	-	-	-	-	5.7	2.9	4.2	15.9	7.2

[a]BAS = BAS 9052; Des = Desmedipham; Dic = Diclofop; Etho = Ethofumesate; Phen = Phenmedipham.
[b]First application applied May 28. Second application applied June 3.
[c]Plant stands were counted on June 19.
[d]Visual ratings of 0 = no sugarbeet suppression and 100 = all plants were killed.
[e]KO = kochia; LQ = common lambsquarters; RPW = redroot pigweed; SE = green and yellow foxtail.

Postemergence evaluations of two new herbicides for selective weed control in sugarbeets. Schild, L. D. and E. E. Schweizer. BAS 9052 and Ro 13-8895 were screened for herbicidal activity on kochia, redroot pigweed, common lambsquarters, and green and yellow foxtail in sugarbeets.

The experiment was conducted on a loam soil with 2.5% organic matter and a pH of 7.7. All herbicide treatments were replicated four times in a randomized complete block design. Weed seed were applied as a mixture on a 10-inch band at 12.9 lb/A on April 17, 1980 and incorporated into a dry, cloddy seed bed. Following weed seed incorporation pelleted 'GW Mono-Hy D2' sugarbeet seeds were planted at 3 seeds per foot of row. Herbicides were applied broadcast at 30 gpa on May 28 when sugarbeets had 4 true leaves. Stages of weed growth at application were: kochia 1/2 to 1-1/2 inches in height, 1/2 to 1-3/4 inches in diameter, with 50% of the plants beginning to elongate; redroot pigweed had 4 to 5 true leaves, 1/2 to 1 inch in diameter (prostrate); common lambsquarters had 4 to 8 true leaves, 1/2 to 1 inch in height; and foxtail species had 4 to 5 leaves with a height of 3/4 to 1-3/4 inches.

The response of sugarbeets and weeds to the herbicides was determined by counting the number of weeds and sugarbeets present in two quadrats, each 4 inches by 10 feet, per treatment from each replication. The stand of weeds and sugarbeets in the treated plots has been expressed as a percentage of those weeds present in the untreated plots. Plant stands were counted on June 19, and sugarbeet suppression was rated on July 1.

Sugarbeet stands were reduced 12% or less (see table). Ro 13-8895 at 0.25 lb ai/A + 0.25% v/v X-77 suppressed the growth of sugarbeets 26%, whereas the mixtures of BAS 9052 + phenmedipham + desmedipham had little if any suppressive effect.

Ethofumesate + phenmedipham + desmedipham at 1.5 + 0.5 + 0.5 lb ai/A controlled kochia, common lambsquarters, and redroot pigweed more effectively than did mixtures of BAS 9052 + phenmedipham + desmedipham. Green and yellow foxtail was controlled completely by Ro 13-8895 + 0.25% v/v X-77 at the rates of 0.25 or 0.50 lb ai/A and by BAS 9052 + phenmedipham + desmedipham at 0.5 + 0.5 + 0.5 lb ai/A.

Possible antagonism for foxtail control was observed when Ro 13-8895 was tank-mixed with ethofumesate + phenmedipham + desmedipham. This screening test suggests that Ro 13-8895 applied alone or BAS 9052 applied with phenmedipham + desmedipham will control green and yellow foxtail effectively. (Western Region, Science and Education Administratinn, U.S. Department of Agriculture, Fort Collins, Colorado 80523).

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

Treatments		Sugarbeets		Weed control (Stand reduction)[b]				
Herbicides[a]	Rate	Stand[b] reduction	Visual[c] rating	KO[d]	LQ	RPW	SE	Avg
	(lb ai/A)	(%)						
Phen + Des	0.5 + 0.5	5	3	35	75	90	30	58
Etho + Phen + Des	1.5 + 0.5 + 0.5	4	0	77	100	95	80	88
BAS 9052 + Phen + Des	0.125 + 0.5 + 0.5	9	0	29	79	86	82	69
BAS 9052 + Phen + Des	0.25 + 0.5 + 0.5	6	3	21	74	80	97	68
BAS 9052 + Phen + Des	0.5 + 0.5 + 0.5	7	0	18	95	79	100	73
Ro 13-8895 + 0.25% v/v X-77	0.125	12	24	0	6	5	79	23
Ro 13-8895 + 0.25% v/v X-77	0.25	9	26	14	24	11	100	37
Ro 13-8895 + 0.25% v/v X-77	0.5	11	16	7	12	15	100	34
Ro 13-8895 + Phen + Des	0.125 + 0.5 + 0.5	5	1	27	84	90	94	74
Ro 13-8895 + Etho + Phen + Des	0.25 + 1.5 + 0.5 + 0.5	8	1	64	99	91	77	83
Check - weeds/ft^2	-	-	-	6.8	2.9	3.2	8.9	5.5

[a]Des = Desmedipham; Etho = Ethofumesate; Phen = Phenmedipham.
[b]Plant counts taken June 18, 1980.
[c]Visual ratings of 0 = no sugarbeet suppression and 100 = all plants killed.
[d]KO = kochia; LQ = common lambsquarters; RPW = redroot pigweed; SE = green and yellow foxtail.

Ethofumesate EC and FL preplant tank-mixtures on sugarbeets, 1980. Sullivan, Edward F. and Keith A. Haagenson. Preplant evaluations were made of ethofumesate formulations in tank-mixes with cycloate, diclofop-methyl, diethatyl-ethyl and pyrazon at Longmont, CO. Spray was delivered at 132 l/ha in a 17.8 cm band. Herbicides were incorporated at the 3.8 cm soil depth with a power tiller simultaneously with crop planting which occurred on April 14. Plot size measured 30 m by 2 rows at 56 cm spacing. Applications were logarithmic with a half-dosage distance of 7.2 m. A RCB design was used with two replications.

Overhead moisture was adequate, measuring 33 mm within 14 days supplemented by surface irrigation, for rapid crop and weed emergence. However, temperatures were below average and early growing conditions were cool and wet. Soil temperature at establishment averaged 13°C. Some grassy weeds were killed by early freezes on May 1-4. Weed species in the untreated controls were redroot pigweed, common lambsquarters, kochia, and green and yellow foxtail. Population density averaged 544 weeds per sq. m.

The seedbed (sandy clay loam, pH 7.5, O.M. 0.9%) was cloddy, rough and dry at the surface with a firm, compacted and wet subsoil. Great Western MONO HY A_4 sugarbeet seed was sown at four seeds per 30.5 cm of row and at 2.5 cm soil depth.

Plant counts were taken on May 28, in each row at a place estimated to have the highest percentage weed control with the least but acceptable crop injury (optimal response); within a quadrat which measured 7.6 cm by 1.2 m. Visual estimates of pre-thinning seedling beet retardation were made.

Weed control results are reported herein as percentages of the untreated control. Excellent broad-species weed kill was obtained from all mixtures regardless of ethofumesate formulation. Computations revealed that total weed control averaged 94 and 91 percentage points for the ethofumesate EC and FL tank-mixes containing cycloate, diclofop-methyl, and diethatyl-ethyl, respectively. No difference occurred between ethofumesate formulations + pyrazon FL mixtures. Kochia control was greatest for ethofumesate EC + diclofop-methyl and least for ethofumesate FL + diethatyl-ethyl. Differences among mixtures for redroot pigweed and grass control were absent. Apparently, only slight if any practical differences occurred between ethofumesate formulations in tank-mix with the other preplant herbicides evaluated. Stand reductions were caused by "damping off" disease and were considered not to be chemically induced. (The Great Western Sugar Company, Agricultural Research Center, Longmont, CO 80501. Published with approval of the Director as Abstract No. 24-H Journal Series).

Percent weed control and sugarbeet injury from preplant herbicides in mixture with ethofumesate formulations, Longmont, CO (Experiment 202, 2 replications).

	Dose kg/ha		Beets		Weeds				
Treatment	Max.	Opt.	Injury	Stand	Rrpw	Ko	Colq	Fxtl	Avg.
ethofumesate EC + cycloate	6.7+6.7	1.3+1.3	35	110	98	56	86	100	92
ethofume. FL + cycloate	6.7+6.7	1.2+1.2	35	102	98	56	86	97	93
ethofume. EC + diclofop-methyl	11.2+9	2.1+1.7	20	80	98	81	90	100	96
ethofume. FL + diclofop	11.2+9	2.4+1.9	25	98	99	56	83	100	93
ethofume. EC + diethatyl-ethyl	6.7+6.7	1.7+1.7	20	112	100	50	76	100	93
ethofume. FL + diethatyl	6.7+6.7	1.6+1.6	25	94	99	19	69	100	88
ethofume. EC + pyrazon FL	6.7+10	1.2+1.8	28	100	99	63	86	94	93
ethofume. FL + pyrazon FL	6.7+10	1.4+2.0	25	102	98	50	83	97	93
Pland count/sq. m untreated				33	326	43	78	97	544

Effect of preemergence and postemergence herbicide treatments on sunflower stand and weed control. Alley, H. P., G. L. Costel, N. E. Humburg and R. E. Vore. A field study was established at the Sheridan Research and Extension Center to evaluate efficacy of metolachlor and Ro 13-8895 alone and metolachlor/chloramben combinations for weed control in dryland sunflowers. Preemergence treatments were made May 6, 1980, and postemergence treatments were made May 27, 1980. Herbicides were applied with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plots were 9 by 30 ft arranged in a randomized complete block with three replications. Soil was a loam (45.0% sand, 24.0% silt and 31.0% clay) with 2.1% organic matter and a pH 7.7. Soil temperature at time of preemergence treatments was 112, 86, 64 and 58 F at surface, 1, 2 and 4 inches, respectively, with air temperature of 80 F and relative humidity 29%. Soil temperature at time of postemergence treatments was 52 F at surface and 1 inch and 50 F at 4 inches. Air temperature was 52 F and relative humidity 43%. A 0.66 inch rainfall was received on May 4, 1980.

Percent weed control and sunflower stand were determined by actual counts made June 25, 1980. Metolachlor alone or in combination with chloramben provided 88 to 100% control of prostrate pigweed. Ro 13-8895, a grass herbicide, was not effective on prostrate pigweed as a preemergence or postemergence treatment. Sunflower stand was not significantly reduced by any treatment. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1083).

Sunflower stand and weed control

Herbicide	Rate lb ai/A	Sunflower Stand %	Percent Weed Control Prostrate pigweed
Preemergence			
metolachlor	2.0	100	88
metolachlor	2.5	97	93
metolachlor/chloramben	1.5 + 2.0	92	100
metolachlor/chloramben	2.0 + 2.0	100	100
metolachlor/chloramben	2.5 + 2.0	100	100
Ro 13-8895	0.5	100	9
Ro 13-8895	1.0	95	23
Postemergence			
Ro 13-8895/X-77	0.25 + 0.5% v/v	95	0
Ro 13-8895/X-77	0.5 + 0.5% v/v	100	0
Check	---	100	0
plants/ft of row, 6-in band		*1.3*	*1.9*

Effect of preplant incorporated herbicides and combinations on sunflower stand and weed control. Alley, H. P., G. L. Costel, N. E. Humburg and R. E. Vore. A field study was established at the Sheridan Research and Extension Center to evaluate the effectiveness of preplant incorporated herbicides on weed control in dryland sunflowers. Herbicides were applied May 6, 1980, with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plot size was 9 by 30 feet arranged in a randomized complete block with three replications. Air temperature was 80 F with relative humidity 39%. Soil temperatures were 112, 86, 64 and 58 F at surface, 1, 2 and 4 inches, respectively. Soil texture was a loam (45.0% sand, 31.0% silt and 24.0% clay) with 2.1% organic matter and pH 7.7. Two hours after application, herbicides were incorporated with a Triple-K unit. A 0.66 inch rain was received May 4, 1980.

Percent weed control and sunflower stand were determined from actual counts made June 25, 1980. All treatments gave 90% or better control of prostrate pigweed with trifluralin/chloramben and ethalfluralin/chloramben combinations at 0.75 + 2.0 lb ai/A providing 100% control. There was no apparent phytotoxicity to sunflowers from any treatment. Sunflower stand was slightly reduced by trifluralin at 0.625 lb ai/A, ethalfluralin at 0.75 lb ai/A and ethalfluralin/chloramben at 0.625 + 2.0 lb ai/A. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1084).

Sunflower stand and weed control

Herbicides	Rate lb ai/A	Sunflower Stand %	Percent Weed Control Prostrate pigweed
trifluralin	0.625	85	95
trifluralin/chloramben	0.625 + 2.0	100	100
trifluralin/chloramben	0.75 + 2.0	100	100
trifluralin/EPTC	0.625 + 2.0	100	90
trifluralin/EPTC	0.75 + 2.0	100	98
ethalfluralin	0.625	100	98
ethalfluralin	0.75	97	97
ethalfluralin/chloramben	0.625 + 2.0	92	95
ethalfluralin/chloramben	0.75 + 2.0	100	100
ethalfluralin/EPTC	0.625 + 2.0	100	93
ethalfluralin/EPTC	0.75 + 2.0	100	98
Check	---	100	0
plants/sq ft		*2.7*	*3.8*

Effect of preplant incorporated herbicides on sunflower stand and weed control. Alley, H. P., G. L. Costel, N. E. Humburg and R. E. Vore. A field study was established at the Sheridan Research and Extension Center to evaluate the effect of preplant incorporated herbicides on weed control in dryland sunflowers. Herbicides were applied on May 6, 1980, with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plots were 9 by 30 ft arranged in a randomized complete block with three replications. Air temperature was 80 F with relative humidity 29%. Soil temperature was 112, 86, 64 and 58 F at surface, 1, 2 and 4 inches, respectively. Soil texture was a loam (45.0% sand, 31.0% silt and 24.0% clay) with 2.1% organic matter and a 7.7 pH. Two hours following application herbicides were incorporated with a Triple-K unit. A 0.66 inch rain occurred on May 4, 1980.

Percent weed control and sunflower stand were determined from counts made June 25, 1980. Metolachlor at 2.5 lb ai/A gave 100% control of prostrate pigweed while vernolate at 2.0 lb ai/A and trifluralin at 0.5 lb ai/A provided 95 and 93% control, respectively. EPTC in combination with pendimethalin, trifluralin, napropamide and metolachlor and chloramben in combination with metolachlor and profluralin gave 91% or better control of prostrate pigweed. No other herbicide or combination achieved 90% control. There was no indication of phytotoxicity to the sunflower crop. Stand reduction was noted in nine plot areas, however, it was not severe. Other weed species were present in the experimental area but not in sufficient density to obtain accurate control evaluations. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1080).

Sunflower stand and weed control

Herbicides	Rate lb ai/A	Sunflower Stand, %	Percent Weed Control Prostrate Pigweed
pendimethalin	1.0	100	63
pendimethalin/EPTC	1.0 + 2.6	95	96
pendimethalin/chloramben	1.0 + 2.0	100	81
cycloate	2.0	100	49
cycloate	3.0	100	75
cycloate	4.0	85	42
EPTC/Extender 6:1E	2.0	95	67
EPTC/Extender 6:1E	3.0	100	72
EPTC	2.0	100	65
EPTC	3.0	95	82
EPTC/trifluralin	2.0 + 0.5	100	91
EPTC/trifluralin	3.0 + 0.5	100	47
vernolate	2.0	100	95
vernolate	3.0	100	54
napropamide	1.0	93	68
napropamide/EPTC	1.0 + 2.0	78	89
napropamide/EPTC	1.0 + 3.0	100	98
metolachlor	2.0	100	88
metolachlor	2.5	100	100
metolachlor/chloramben	1.5 + 2.0	100	98
metolachlor/chloramben	2.0 + 2.0	100	88
metolachlor/chloramben	2.5 + 2.0	95	96
metolachlor/EPTC	1.5 + 2.0	100	88
metolachlor/EPTC	2.0 + 2.0	90	95
profluralin	1.0	100	89
profluralin/chloramben	1.0 + 2.0	100	95
profluralin/EPTC	0.75 + 2.0	100	72
trifluralin	0.5	98	93
trifluralin	0.75	100	65
Check	---	100	0
plants/linear ft 6 in. band		*1.3*	*1.9*

Effect of preplant incorporated herbicides on sunflower stand and weed control. Alley, H. P., D. F. Ernst, N. E. Humburg and R. E. Vore. A field study to evaluate preplant incorporated herbicides and combinations efficacy on weed control in irrigated sunflowers was established on the Torrington Research and Extension Center. Herbicides were applied May 19, 1980, with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plot size was 9 by 30 ft in a randomized complete block with three replications. Air temperature was 72 F with relative humidity 31%. Soil temperature was 72, 69, 70 and 65 F at the surface, 1, 2 and 4 inch depths, respectively. Soil texture was a loamy sand (81.2% sand, 12.8% silt and 6.0% clay) with 1.5% organic matter and a 7.2 pH. Immediately following application, herbicides were incorporated with a finger tine harrow. The sunflower (Imperial 891 variety) was planted following incorporation and irrigated with a lateral-move, low-pressure sprinkler.

Percent weed control and sunflower stand was determined from actual counts made June 19, 1980. Pendimethalin/EPTC at 1.0 + 2.6 lb ai/A, EPTC/trifluralin at 3.0 + 0.5 lb ai/A, napropamide/EPTC at 1.0 + 3.0 lb ai/A, metolachlor/EPTC at 1.5 + 2.0 lb ai/A and profluralin/EPTC at 0.75 + 2.0 lb ai/A provided 93% or better grass control and 89 to 100% control of broadleaf weed species present. Vernolate at 2.0 lb ai/A, metolachlor/chloramben and profluralin/chloramben gave similar results for broadleaf weed control. Mild leaf chlorosis on sunflowers was evident in plots treated with napropamide, napropamide/EPTC and metolachlor/EPTC at time of evaluation with full recovery noted later in the growing season. Severe leaf injury was observed from EPTC/Extender, EPTC/trifluralin and vernolate. Sunflower stunting varied among replications. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1081).

Sunflower stand and weed control

Herbicides	Rate lb ai/A	Sunflower[1] Stand %	Stunting 0-10	Leaf injury 0-10	Percent Weed Control[2] PW	NS	LQ	GR
pendimethalin	1.0	92	0.3	0	61	95	84	74
pendimethalin/EPTC	1.0 + 2.6	71	2.0	0.7	94	95	98	93
pendimethalin/chloramben	1.0 + 2.0	100	1.3	0	82	90	84	56
cycloate	2.0	100	1.0	0	61	81	81	63
cycloate	3.0	100	0	0.3	48	100	83	37
cycloate	4.0	100	0.7	1.0	67	90	86	0
EPTC/Extender 6:1E	2.0	75	2.7	2.0	82	95	83	22
EPTC/Extender 6:1E	3.0	100	3.0	3.0	91	67	83	41
EPTC	2.0	100	1.7	1.3	73	100	87	78
EPTC	3.0	100	2.7	2.7	85	100	87	41
EPTC/trifluralin	2.0 + 0.5	100	1.3	1.7	82	95	97	41
EPTC/trifluralin	3.0 + 0.5	96	3.3	3.7	100	100	98	96
vernolate	2.0	100	0.3	0.7	39	86	43	0
vernolate	3.0	92	6.0	6.3	91	100	100	63
napropamide	1.0	88	0.7	0.3	67	38	94	0
napropamide	1.0 + 2.0	100	2.3	1.0	55	76	76	70
napropamide	1.0 + 3.0	96	3.0	2.0	97	95	89	96
metolachlor	2.0	96	0.3	0.3	82	95	68	26
metolachlor	2.5	100	0.7	0.3	64	95	81	67
metolachlor/chloramben	1.5 + 2.0	100	1.7	0	91	90	97	22
metolachlor/chloramben	2.0 + 2.0	96	3.0	0	91	100	89	0
metolachlor/chloramben	2.5 + 2.0	96	2.7	0.3	97	100	100	74
metolachlor/EPTC	1.5 + 2.0	71	2.0	1.3	97	100	89	96
metolachlor/EPTC	2.0 + 2.0	100	2.7	1.7	91	100	87	89
profluralin	1.0	100	0.7	0	76	57	69	0
profluralin/chloramben	1.0 + 2.0	92	1.0	0	91	96	91	56
profluralin/EPTC	0.75 + 2.0	92	2.0	0.7	100	100	99	100
trifluralin	0.5	96	0	0	42	71	83	0
trifluralin	0.75	100	1.0	0.3	67	19	73	48
Check	---	100	0	0	0	0	0	0
plants/linear ft 6 in. band		*0.8*			*1.1*	*0.7*	*2.2*	*0.9*

[1]Stunting: 0 = no height reduction; 10 = no growth of foliage.
Leaf injury: 0 = normally developed leaf; 10 = unexpanded epinastic or necrotic leaf.
[2]Abbreviations: PW = redroot pigweed; NS = hairy nightshade; LQ = common lambsquarters; GR = field sandbur and green foxtail.

Effect of preemergence herbicide treatments on sunflower stand and weed control. Alley, H. P., G. D. Jackson, N. E. Humburg and R. E. Vore. A field study was established at the Powell Research and Extension Center to evaluate efficacy of preemergence treatments for weed control in irrigated sunflowers (variety Dahlgren DO-820). Herbicides were applied on May 22, 1980, with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plot size was 9 by 30 ft in a randomized complete block with three replications. Air temperature was 84 F with relative humidity 34%. Soil temperature was 77, 66 and 64 F at 1, 2 and 4 inches, respectively.

Percent weed control and sunflower stand were determined by counts made June 24, 1980. Combinations containing chloramben were effective in controlling wild buckwheat. Oryzalin/chloramben combination at 1.0 + 2.0 lb ai/A controlled 100% of both redroot pigweed and wild buckwheat. All treatments and combinations, except oryzalin alone, were effective in removal of redroot pigweed. Sunflower stand was reduced slightly on metolachlor/chloramben and pendimethalin/chloramben plots; however, no treatment or combination caused injury to crop plants. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1082).

Sunflower stand and weed control

Herbicide	Rate lb ai/A	Sunflower Stand %	Percent Control	
			Redroot pigweed	Wild buckwheat
alachlor	3.0	100	100	12
alachlor/chloramben	2.5 + 2.0	100	100	88
metolachlor	2.5	100	100	0
metolachlor/chloramben	2.5 + 2.0	92	100	94
pendimethalin	1.0	100	93	88
pendimethalin	1.0 + 2.0	92	93	100
oryzalin	1.0	100	73	62
oryzalin	1.5	100	67	50
oryzalin/chloramben	1.0 + 2.0	100	100	100
Check	---	100	0	0
plants/sq ft		*1.7*	*1.0*	*1.1*

Effect of preplant incorporated herbicides on sunflower stand and weed control. Alley, H. P., G. D. Jackson, N. E. Humburg and R. E. Vore. A field study was established at the Powell Research and Extension Center to evaluate the effectiveness of preplant incorporated herbicides for weed control in irrigated sunflowers (variety Dahlgren DO-820). Herbicides were applied May 20, 1980, with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plots were 9 by 30 ft in a randomized complete block with three replications. One hour after application, herbicides were roller harrow incorporated at a 2-inch depth. Sunflower seed was planted the day following application. Air temperature at time of application was 70 F. Soil was a loam (41.6% sand, 34.4% silt and 24.0% clay) with 1.5% organic matter and a pH of 8.1. The field was furrow irrigated the day following planting and then as needed.

Percent weed control and sunflower stand were determined by counts made June 24, 1980. Ethalfluralin at 0.75 lb ai/A was the only single treatment which provided 100% control of the weed spectrum. Nine herbicide combinations gave 100% control. Treatments resulting in 100% control of the weed spectrum were all combinations containing chloramben along with ethalfluralin/EPTC. There was no crop phytotoxicity apparent while reduction in sunflower stand was moderate to none. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1078).

Sunflower stand and weed control

Herbicides	Rate lb ai/A	Sunflower Stand %	Sunflower Injury	Weed Control RPW	Weed Control BW	Weed Control Other[1]
pendimethalin	1.0	100	0	75	87	98
pendimethalin/chloramben	1.0 + 2.0	100	0	100	100	100
metolachlor	2.5	100	0	100	80	95
metolachlor/chloramben	2.5 + 2.0	100	0	100	100	100
profluralin	1.0	100	0	75	53	95
profluralin/chloramben	1.0 + 2.0	100	0	100	100	100
EPTC	3.0	100	0	33	53	85
trifluralin	0.625	89	0	83	40	98
trifluralin	0.75	95	0	100	40	98
trifluralin/chloramben	0.625 + 2.0	89	0	100	100	100
trifluralin/chloramben	0.75 + 2.0	95	0	100	100	100
trifluralin/EPTC	0.625 + 2.0	100	0	75	100	100
trifluralin/EPTC	0.75 + 2.0	95	0	100	73	98
ethalfluralin	0.625	96	0	100	87	98
ethalfluralin	0.75	100	0	100	100	100
ethalfluralin/chloramben	0.625 + 2.0	79	0	100	100	100
ethalfluralin/chloramben	0.75 + 2.0	100	0	100	100	100
ethalfluralin/EPTC	0.625 + 2.0	100	0	100	100	100
ethalfluralin/EPTC	0.75 + 2.0	100	0	100	100	100
Check	---	100	0	0	0	0
plants/sq ft				*0.4*	*0.5*	*1.4*

[1]Abbreviations: RPW = redroot pigweed; BW = wild buckwheat; Others include wild mustard, Russian thistle, common lambsquarters and green foxtail.

Effect of preemergence, preemergence/postemergence and postemergence herbicides on sunflower stand and weed control. Humburg, N. E., H. P. Alley, D. F. Ernst and R. E. Vore. A field study was established at the Torrington Research and Extension Center to evaluate preemergence, preemergence/postemergence and postemergence herbicides on weed control in irrigated sunflowers. Herbicides were applied with a 6-nozzle knapsack sprayer delivering 40 gpa water solution. Plots were 9 by 30 ft arranged in a randomized complete block with three replications. Soil texture was a loamy sand (82.2% sand, 10.4% silt and 7.4% clay) with 1.5% organic matter and 7.5 pH. Preemergence treatments were made May 20, 1980. Air temperature was 69 F with relative humidity 83%. Soil temperature was 75, 73, 63 and 53 F at surface, 1, 2 and 4 inches, respectively. Postemergence treatments were made June 12, 1980. Air temperature was 71 F with relative humidity 43%. Soil temperature was 87, 79, 73 and 69 F at surface, 1, 2 and 4 inches, respectively. The sunflower (variety Imperial 891) was planted May 19, 1980, and irrigated with a lateral-move, low-pressure sprinkler.

Percent weed control and sunflower stand for preemergence treatments were determined from counts made June 19, 1980. Field sandbur control resulting from preemergence Ro 13-8895 was visually evaluated on June 19, 1980, and again July 23, 1980. Preemergence/postemergence and postemergence treatments were visually evaluated on June 26 and July 23, 1980. Chloramben alone and metolachlor/chloramben combinations gave equivalent broadleaf weed control. Addition of Ro 13-8895 to chloramben provided increased field sandbur control and good control of broadleaf weeds. Preemergence Ro 13-8895 at 1.0 lb ai/A appears to have good grass control potential. From visual evaluations made July 23, 1980, postemergence Ro 13-8895 treatments were twice as effective as preemergence Ro 13-8895 treatments on an equal rate basis. No treatment appeared to be phytotoxic to sunflowers. Sunflower stand was reduced in the preemergence chloramben/Ro 13-8895 treatment area. (Wyoming Agric. Exp. Sta., Laramie 80271, SR 1079).

Sunflower stand and weed control

Herbicides[1]	Rate lb ai/A	Sunflower Stand[2] %	Percent Weed Control[2] PW	NS	LQ	SB	Observations[3]
Preemergence							
metolachlor	2.0	100	56	67	40	67	
metolachlor	2.5	100	39	67	12	70	
metolachlor + chloramben	1.5 + 2.0	100	96	100	88	65	
metolachlor + chloramben	2.0 + 2.0	100	100	94	88	57	
metolachlor + chloramben	2.5 + 2.0	100	99	100	88	47	
chloramben	2.0	100	100	94	80	63	
chloramben	3.0	100	99	87	88	55	
chloramben + Ro 13-8895	2.0 + 0.5	79	96	87	94	81	
Ro 13-8895	0.5	100	---	---	---	56	B
Ro 13-8895	1.0	100				96	C
Preemergence/Early Post							
chloramben/ Ro 13-8895 + X-77	2.0 0.5	100	97	93	96	74	AC
Early Postemergence							
Ro 13-8895	0.25	---	---	---	---	---	AB
Ro 13-8895	0.5	---	---	---	---	---	AC
Check	---	100	0	0	0	0	
plants/ft of row, 6-in band		*0.6*	*2.4*	*0.5*	*4.5*	*2.5*	

[1]Herbicides applied preemergence May 20, 1980, and postemergence June 12, 1980. X-77 applied at 0.5% v/v.

[2]Plant counts made June 19, 1980, on preemergence-treated plots. Abbreviations: PW = redroot pigweed; NS = hairy nightshade; LQ = common lambsquarters; SB = field sandbur.

[3]Observations: A = evaluated June 26: field sandbur 50% killed and 50% severely injured with 1 to 5-in height. B = evaluated July 23; field sandbur 2 ft height, variable populations from sparse to dense, racemes open with seed well formed, dead leaves at base of plants, and appearance same as in check plots. C = evaluated July 23: field sandbur 1 ft height, sparse to moderate populations, and sheaths enclosing racemes.

Weed control with preplant incorporated herbicides in sunflower. Handly, J. V., G. A. Lee and D. C. Thill. A study was initiated at Moscow, Idaho, on May 5, 1980 to evaluate the performance of seven preplant incorporated herbicides for weed control in sunflower. Treatments were applied with a knapsack sprayer fitted with a three nozzle boom calibrated to deliver 378 l/ha. The air temperature was 11 C, relative humidity was 98%, soil temperature at 10 cm was 13 C, moisture was high and the sky was cloudy at time of application. Treatments were incorporated once with a flextine harrow traveling 5 km/hr. to a depth of 4.5 cm. Sunflower was seeded on May 8, 1980 at a rate of 1 seed every 25 cm on 76 cm centers. The design was a randomized complete block with three replications. The plots were 9.1 m by 3 m with 4 planted rows in each plot. Visual evaluation of crop vigor, stand reduction, and weed control was taken on July 2, 1980. The plots were harvested on October 2, 1980 with a Hege plot combine.

No significant reductions in vigor or stand were observed. Control of observed weed species was marginal in all cases. Significantly higher yields were obtained with chloramben at 3.4 kg/ha, although all yields were affected by severe bird damage. (Idaho Agriculture Experiment Station, Moscow 83843).

Weed Control with Pre-plant Incorporated Herbicides in Sunflowers. Moscow, Idaho, 1980

Treatment	Rate kg ai/h	Crop SR[1]	Crop VR[2]	Percent Control Mayweed	Percent Control Lambsquarter	Percent Control Groundsel	Yield Kg/ha
check	-	0	0	0	0	0	162b
chloramben	2.2	3a	0a	10a	22ab	0a	236b
chloramben	3.4	0a	2a	40a	57a	10a	514a
trifluralin	.6	0a	0a	3a	0b	0a	189b
trifluralin	1.1	10a	3a	33a	40ab	0a	288b
EPTC	3.4	5a	0a	7a	0b	13a	212b
EPTC	4.5	10a	3a	0a	3b	30a	133b
EPTC	6.7	3a	2a	20a	0b	0a	271b
vernolate	6.7	7a	3a	33a	33ab	10a	190b
butylate	6.7	8a	7a	20a	3b	23a	110b
cycloate	6.7	7a	5a	32a	0b	10a	180b
profluralin	.6	3a	12a	13a	7b	0a	157b
profluralin	1.1	8a	7a	22a	48ab	0a	208b

Means within a column followed by the same letter are not significantly different at the .05 level.

SR = stand reduction
VR = vigor reduction

Chemical fallow with winter-applied propham, atrazine and metribuzin. Callihan, R. H. and P. W. Leino. A study was initiated on a fallow dryland wheat field with a silt loam soil to determine the efficacy of propham, atrazine, metribuzin and combinations in chemical fallow.

Herbicides were applied January 4,1980 using a tractor-mounted sprayer equipped with eight 8005 nozzles operating at 25 psi at 3 mph, calibrated to deliver 35 gpa by compressed air. The soil surface at the time of application was -3 C, but unfrozen for one cm depth over frozen soil, and the air temperature was 0.5 C. Plots were arranged in a randomized complete block design, 12 feet by 40 feet with four replications.

Weeds were counted on two dates, April 15, 1980 and May 19, 1980. Categories included grasses--95% volunteer wheat and 5% downy brome (Bromus tectorum); and broadleaves--90% smallseed false-flax (Camelina microcarpa) and 10% Brassica, salasola, and others.

The propham-metribuzin combinations (3 + .5 lb/A and 6 + .75 lb/A) and the propham-atrazine combinations (6 + .75 lb/A) exhibited acceptable control of both volunteer wheat and dicotyledonous weeds. Metribuzin alone controlled all dicotyledonous weeds. Propham alone controlled volunteer wheat. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Weed survival in chemical fallow treatments

Herbicide	lb/A	Dicots[1/] Apr 15	Dicots[1/] May 19	Gramineae[1/] Apr 15	Gramineae[1/] May 19
Propham	3	3	14	6	11
Propham	3	15	72	2	11
Metribuzin	0.5	0	4	38	180
Propham + metribuzin	3.0 + 0.25	3	22	11	25
Propham + metribuzin	3.0 + 0.5	2	14	4	7
Propham + metribuzin	6.0 + 0.5	1	4	2	4
Atrazine	0.5	12	54	25	65
Propham + atrazine	2.0 + 0.25	6	40	17	97
Propham + atrazine	3.0 + 0.5	7	29	1	4
Propham + atrazine	6.0 + 0.75	1	7	2	18
Control		19	65	41	230
LSD 5%		17	59	32	151

[1/] Plant per square meter.

Experimental chemical fallow herbicides for jointed goatgrass control at Ovid, Colo. Donald W. W. Potential herbicides for jointed goatgrass control in chemical fallow were screened for efficacy in the greenhouse earlier.[1] This latter experiment was designed to test whether promising nonselective herbicides from that screen were effective in the field. Most herbicides that were tested had shown promise elsewhere in the western U. S. for use in chemical fallow.

The experiment was laid out and sprayed on wheat stubble on Mr. J. Gerk's farm, south of Ovid, Colo. on August 24, 1979. The experiment was a randomized block design with four replications. The soil was a loam (30% sand, 45% silt and 25% clay) with a pH of 5.9 and 2.3% organic matter. Individual plots were 6 feet by 30 feet. The treatments were applied with a bicycle sprayer which had 4 spray nozzles (Tee Jet 8001), 1.5 feet apart on a 6 foot boom. The carrier volume was applied at 14.4 gal/A and 40 psi. The wind was blowing at 3 to 5 mph during spraying. The soil was dry. Soil and air temperature were both 26.7 C. at the time of spraying. Common ragweed, sunflower, kochia and witchgrass were the major weeds. Jointed goatgrass and volunteer wheat had not emerged at the time of spraying. The wheat straw residue was 2600 lb/A and 3/4 foot tall. Ratings were taken on April 29, 1980. Ratings were significant at p=0.05 by a one-way ANOVA. Means were separated by Duncan's multiple range test at p=0.05.

The tabulated results demonstrate that herbicide combinations with hexazinone or buthidazole, metriflufen, brominal and terbacil alone were sufficently persistent to give satisfactory volunteer wheat and jointed goatgrass control through April following fall treatment. Kochia, Russian thistle and common ragweed were established at the time of rating. Hexazinone alone was not as effective on broadleaves as in combination with atrazine, metribuzin, diuron or DPX-4189. Buthidazole, brominal and terbacil alone gave adequate grass and broadleaf weed control at this site on the April rating. Diuron, tebuthiuron, DPX-4189, dalapon and oxyfluorfen were ineffective alone on volunteer wheat and jointed goatgrass, despite promising results in the greenhouse screen. Hexazinone combinations should be tested further in the field at several sites in order to substantiate these preliminary results. Terbacil and tebuthiuron were dropped by DuPont and Elanco, respectively, for use in chemical fallow in Colorado because of their excessive soil persistence. The soil persistence of hexazinone in relation to carryover injury to winter wheat is also unknown. (Weed Research Laboratory, Colorado State University, Fort Collins, Colo. 80523).

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[1]Donald, W. W. 1980. Greenhouse screening trials of herbicides efficacy in jointed goatgrass and 'Centuck' winter wheat. Res. Prog. Rep. Western Society of Weed Science, p. 312-319.

Jointed goatgrass and volunteer wheat control in chemical fallow following fall treatment on August 22, 1979. Means in a column followed by the same letters do not differ significantly at p=0.05 by Duncan's multiple range test

Herbicide	Rate lb ai/A	Percent Control (April 29, 1980)			
		Grass	KOCZ	Ruth	Corw
Hexazinone + glyphosate	0.45 + 0.5	38 bc	88 ab	44 a-d	100 a
Hexazinone + glyphosate	0.9 + 0.5	28 cd	75 a-c	20 cd	75 ab
Hexaninone + atrazine + glyphosate	0.9 + 0.5 + 0.5	94 a	100 a	91 ab	100 a
Hexazinone + metribuzin (Sencor) + glyphosate	0.9 + 0.5 + 0.5	74 a	100 a	51 a-d	100 a
Hexazinone + diuron + glyphosate	0.9 + 1.0 + 0.5	94 a	100 a	86 ab	100 a
Hexazinone + diuron + glyphosate	0.45 + 1.0 + 0.5	68 ab	100 a	55 a-d	100 a
Diuron + glyphosate	1.0 + 0.5	3 d	63 a-c	45 a-d	75 ab
Tebuthiuron + glyphosate	0.25 + 0.5	3 d	88 ab	73 a-c	78 ab
Tebuthiuron + glyphosate	0.5 + 0.5	5 d	100 a	40 a-d	100 a
Glyphosate	0.5	0 d	63 a-c	48 a-d	50 ab
DPX 4189 + glyphosate	0.04 + 0.5	3 d	100 a	100 a	100 a
DPX 4189 + glyphosate	0.08 + 0.5	3 d	100 a	100 a	100 a
Hexazinone + metribuzin (Lexone) + glyphosate	0.9 + 0.5 + 0.5	99 a	100 a	100 a	100 a
Hexazinone + DPX 4189 + glyphosate	0.45 + 0.04 + 0.5	73 a	100 a	100 a	100 a
Hexazinone + DPX 4189 + glyphosate	0.45 + 0.8 + 0.5	41 bc	75 a-c	75 a-c	75 ab
Buthidazole + glyphosate	1.0 + 0.5	82 a	100 a	95 ab	100 a
Dalapon + glyphosate	3.0 + 0.5	3 d	25 cd	0 d	25 b
Control	---	0 d	0 cd	0 d	0 b
Metriflufen + glyphosate	1.0 + 0.5	69 ab	25 cd	25 cd	50 ab
Metriflufen + glyphosate	2.0 + 0.5	88 a	45 a-d	15 cd	45 ab
Oxyfluorfen + glyphosate	1.0 + 0.5	5 d	53 a-c	3 d	60 ab
Oxyfluorfen + glyphosate	2.0 + 0.5	3 d	75 a-c	75 a-c	75 ab
Brominal + glyphosate	1.0 + 0.5	90 a	100 a	73 a-c	100 a
Terbacil + glyphosate	1.0 + 0.5	98 a	100 a	91 ab	100 a

[1]Grass = jointed goatgrass + volunteer wheat, KOCZ = kochia, Ruth = Russian thistle and corw = common ragweed.

Experimental chemical fallow herbicides for jointed goatgrass control at Limon, Colo. Donald, W. W. Potential herbicides for jointed goatgrass control in chemical fallow were screened for efficacy in the greenhouse earlier.[1] This latter experiment was designed to test whether promising non-selective herbicides from that screen were effective in the field. Most herbicides that were tested had shown promise elsewhere in the western U. S. for use in chemical fallow.

The experiment was laid out and sprayed on wheat stubble on Mr. W. Kissel's farm, south of Limon, Colo. on August 22, 1979. The experiment was a randomized block design with three replications. The soil was a loam (52% sand, 29% silt, 19% clay) with a pH of 6.1 and 1.7% organic matter. Individual plots were 6 feet by 30 feet. Treatments were applied with a bicycle sprayer which had 4 spray nozzles (Tee Jet 8001), 1.5 feet apart on a 6 foot boom. The carrier volume was applied at 15.2 gal/A and 40 psi. The wind was blowing at 8 to 10 mph during spraying. The soil surface was dry, but the subsurface soil was moist within one inch of the surface. Soil and air temperature were 19.4 C and 33.3 C, respectively. At the time of spraying, witchgrass, volunteer wheat and jointed goatgrass were present 1/2 foot below the wheat stubble, which was 1 1/2 feet tall. The stubble was matted and lodged in spots and dicot weed species were sparse. Redroot pigweed, sunflower, prostrate pigweed and kochia were the major dicot species. Ratings were taken in the fall and spring on Oct. 17, 1979 and April 29, 1980, respectively. Ratings were significant at p=0.05 by a one-way ANOVA. Means were separated by Duncan's multiple range test at p=0.05. Midsummer ratings were not taken because Mr. Kissel disced up the plots. There was sufficient fall rainfall for jointed goatgrass and volunteer wheat establishment during the two months between spraying and the first fall rating.

The tabulated results demonstrate that herbicide combinations with hexazinone and terbacil were sufficiently persistent to give satisfactory volunteer wheat and jointed goatgrass control through late April following fall treatment. Broadleaf weeds were not a problem at that time. Hexazinone in combination with either metribuzin or atrazine tended to be better than hexazinone alone or hexazinone and diuron, although the data were not significantly different.

Despite promising results in the greenhouse screen, tebuthiuron, DPX-4189, buthidazole, dalapon and metriflufen were ineffective in the field at this site with the rates that were used. Hexazinone combinations should be tested further in the field at several sites in order to substantiate these preliminary results. Terbacil was dropped by DuPont for use in chemical fallow in Colorado because of its excessive persistence. The soil persistence of hexazinone in relation to carryover injury to winter wheat is also unknown. (Colorado State University, Fort Collins, Colo. 80523).

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[1]Donald, W. W. 1980. Greenhouse screening trials of herbicides efficacy in jointed goatgrass and 'Centuck' winter wheat. Res. Prog. Rep. Western Society of Weed Science, p. 312-319.

Jointed goatgrass and volunteer wheat control in chemical fallow following fall treatment on August 22, 1979. Means in a column followed by the same letter do not differ significantly at $p = 0.05$ by Duncan's multiple range test

Herbicide	Rate lb ai/A	Percent Control Oct. 17 1979	Percent Control Apr. 29 1980
Control	----	0 c	0 b
Hexazinone + glyphosate	0.9 + 0.5	60 ab	62 a
Hexazinone + atrazine + glyphosate	0.9 + 0.5 + 0.5	88 a	90 a
Hexazinone + metribuzin + glyphosate	0.9 + 1.0 + 0.5	90 a	91 a
Hexazinone + diuron + glyphosate	0.9 + 1.0 + 0.5	82 a	70 a
Tebuthiuron + glyphosate	0.25 + 0.5	23 bc	0 b
Tebuthiuron + glyphosate	0.5 + 0.5	22 bc	0 b
Glyphosate	0.5	10 bc	0 b
DPX-4189 + glyphosate	0.08 + 0.5	47 a-c	0 b
DPX-4189 + hexazinone + glyphosate	0.08 + 0.5 + 0.5	52 a-c	20 b
Buthidazole + glyphosate	1.0 + 0.5	27 bc	7 b
Terbacil + glyphosate	1.0 + 0.5	80 ab	86 a
Dalapon + glyphosate	3.0 + 0.5	37 a-c	23 b
Dalapon + glyphosate	3.0 + 0.5	20 bc	13 b
Metriflufen + glyphosate	2.0 + 0.5	12 bc	0 b

Registered chemical fallow herbicides for jointed goatgrass control in Colorado. Donald, W. W. This field experiment was designed to test whether the currently registered chemical fallow herbicides effectively controlled jointed goatgrass (*Aegilops cylindrica* Host). Previous greenhouse studies suggested that neither atrazine, cyanazine nor metribuzin would adequately control jointed goatgrass in chemical fallow.[1]

The experiment was laid out and sprayed on wheat stubble on Mr. W. Kissel's farm, south of Limon, Colo. on August 20, 1979. The experiment was a randomized block design with four replications. The soil was a clay loam with a pH of 6.1 and 1.7% organic matter. Individual plots were 6 feet by 30 feet. Treatments were applied with a bicycle sprayer which had 4 spray nozzles (Tee Jet 8001), 1.5 feet apart on a 6 foot boom. The carrier volume was applied at 15.7 gal/A and 40 psi. The wind was blowing at 4 to 5 mph during spraying. The soil surface was dry, but the subsurface soil was moist within one inch of the surface. Soil and air temperature were 23.9 C and 22.2 C, respectively. At the time of spraying, witchgrass, volunteer wheat, and jointed goatgrass were present 1/2 foot below the wheat stubble, which was 1 1/2 feet tall. The stubble was matted and lodged in spots and dicot weed species were sparse. Redroot pigweed, sunflower, prostrate pigweed and kochia were the major dicot species. Ratings were taken in the fall and spring on Oct. 1, 1979 and April 29, 1980, respectively. There was sufficient fall rainfall for jointed goatgrass and volunteer wheat germination about two months after spraying at the first rating.

The tabulated results demonstrate that atrazine, cyanazine or metribuzin alone, or in combination were ineffective in providing long term control of jointed goatgrass or volunteer wheat in this trial. The herbicides, however, were not completely effective on these species, even in the fall. The herbicides were effective on dicots. Because of carryover problems to wheat in eastern Colorado rates of atrazine or atrazine combinations greater than 1 lb. ai/A are not recommended. (Weed Research Laboratory, Colorado State University, Fort Collins, Colo. 80523)

Jointed goatgrass and volunteer wheat control in chemical fallow following fall treatment on August 20, 1979

Herbicide	Rate lb ai/A	Percent Control Oct. 1 1979	Percent Control Apr. 29 1980
Control	----	0	0
Atrazine + Glyphosate	1.0 + 0.5	60	0
Cyanazine + Glyphosate	0.5 + 0.5	31	0
Cyanazine + Glyphosate	1.0 + 0.5	14	0
Atrazine + Cyanazine + Glyphosate	0.5 + 0.5 + 0.5	55	0
Metribuzin + Glyphosate	0.5 + 0.5	23	0
Metribuzin + Glyphosate	1.0 + 0.5	59	0
Metribuzin + Atrazine + Glyphosate	0.5 + 1.0 + 0.5	73	0
Metribuzin + Atrazine + Glyphosate	1.0 + 1.0 + 0.5	76	0
Glyphosate	0.5	18	0

[1]Donald, W. W. 1980. Greenhouse screening trials of herbicides efficacy in jointed goatgrass and 'Centuck' winter wheat. Res. Prog. Rep. Western Society of Weed Science, p. 312-319.

After-harvest herbicide treatments for controlling fallow-season weeds in winter wheat fields. Humburg, N. E. and H. P. Alley. Herbicides were applied to untilled plots one month after harvest of winter wheat. Each treatment was replicated three times; 9 by 30 ft plots were arranged in a randomized complete block design. Environmental conditions when treatments were made on September 4, 1979, were: air temperature, 91 F; relative humidity, 20%, clear sky; wind, 0 to 2 mph; and soil temperatures of 112, 93, 77 and 69 F for the surface and depths of 1, 2 and 4 inches. The soil was sandy loam (57.2% sand, 37.6% silt and 5.2% clay) with pH 8.1 and 2.6% organic matter. At the time of treatment Russian thistle was in early- to late-bloom stages of development with a height of 6 to 18 inches. Slimleaf lambsquarters was in an early stage of seed development and was 10 to 18 inches tall. Volunteer wheat was 4 to 6 inches tall.

Plots were evaluated for control of weeds on June 17, 1980. Russian thistle was totally controlled on all plots treated with EL-187, with the exception of the lowest application rate of 0.4 lb ai/A. The 0.4 lb ai/A rate of EL-187 indicated a threshold level for the material as 79% of the volunteer wheat was controlled, as compared with 99% at higher rates. RE-28269 + atrazine provided virtually complete control of Russian thistle and volunteer wheat. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1087).

After-harvest herbicide treatments for controlling fallow-season weeds in winter wheat fields

Herbicide[1]	Rate lb ai/A	Percent Control[2] Russian thistle	Volunteer wheat
EL-187	0.4	99	79
EL-187	0.5	100	99
EL-187	0.6	100	99
EL-187	0.75	100	99
EL-187 + atrazine	0.4 + 0.4	100	100
EL-187 + atrazine	0.4 + 0.6	100	99
EL-187 + atrazine	0.4 + 0.8	100	99
EL-187 + atrazine	0.5 + 0.5	100	99
EL-187 + atrazine	0.5 + 0.75	100	100
EL-187 + atrazine	0.6 + 0.6	100	100
RE-28269 + atrazine	0.5 + 0.6	99	99
RE-28269 + atrazine	1.0 + 0.6	99	99
RE-28269 + atrazine	2.0 + 0.6	100	97
atrazine	0.8	88	68
Check	---	0	0
plants/sq ft		*18.4*	*28.3*

[1]Herbicides applied September 4, 1979.
[2]Visual evaluations June 17, 1980.

Summer-applied herbicides for weed control in fallow-system winter wheat. Humburg, N. E. and H. P. Alley. Herbicides were applied to the soil surface and undisturbed wheat stubble on August 8, 1978, two weeks after harvest. Forty gallons per acre of herbicide-water solution was broadcast with a knapsack sprayer. Kochia was 4 to 8-in tall and slimleaf lambsquarters and Russian thistle were 6 to 8-in tall. Treatments were replicated three times, with 9 by 30 ft plots arranged in a randomized complete block design. Environmental conditions at the time of herbicide application were: air temperature, 85 F; relative humidity, 32%; wind, 5 to 7 mph; partly cloudy; and soil temperatures of 110, 102, 87 and 80 F for the surface and depths of 1, 2 and 4 inches, respectively. Soil was sandy loam (59.2% sand, 27.2% silt and 13.6% clay) with 5.9 pH and 1.6% organic matter.

Herbicide treatments were evaluated during the fallow period by visually rating control of each weed species on May 29, 1979. Russian thistle and slimleaf lambsquarters in check plots were extremely dense at the time of evaluation. No herbicide treatment gave total control of all weed species present in the research area; however, five of 13 treatments gave better than 90% control. Outstanding treatments were metribuzin + atrazine at 0.75 + 0.75, atrazine + glyphosate at 1.0 + 0.5 lb/A, metribuzin at 1.0 lb/A, atrazine + glyphosate at 1.0 + 0.38 lb/A and metribuzin + glyphosate at 0.75 + 0.5 lb/A.

Weeds were counted July 21, 1980, one week before harvest. Weeds were small and populations were low; there was no competitive effect to the wheat. Good weed control during the summerfallow period in 1979 as well as possible residual effect from atrazine resulted in some plots being virtually free of weeds in the standing wheat crop. Plots treated with atrazine at 0.8 or 1.0 lb/A gave outstanding control of Russian thistle and erect knotweed. Wheat stands and grain yields were reduced by hexazinone and/or metribuzin at the greater application rates. Stands and yields of wheat from plots where weed control was inadequate were similar to that of the untreated check plots, reflecting a combination of possible herbicidal injury as well as soil moisture depletion. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1086).

Summer-applied herbicides for weed control in fallow-system winter wheat

Herbicide[1]	Rate lb/A	Percent Weed Control[2] 1979 KO	1979 LQ	1979 RT	1980 RT	1980 KW	Winter Wheat[3] Stand %	Height in	Yield bu/A
hexazinone + metribuzin + WK	0.5 + 0.5	72	100	72	20	90	67	26	10
hexazinone + metribuzin + WK	0.5 + 1.0	83	100	91	55	90	63	28	12
metribuzin	0.5	60	95	56	65	90	93	28	14
metribuzin	1.0	99	100	96	100	55	85	25	13
metribuzin + atrazine	0.5 + 0.5	81	83	97	65	65	98	29	17
metribuzin + paraquat	0.5 + 0.25	68	98	95	100	55	87	25	13
metribuzin + atrazine	0.75 + 0.75	100	100	99	80	55	100	31	18
metribuzin + glyphosate	0.75 + 0.38	92	100	89	90	45	70	25	13
metribuzin + glyphosate	0.75 + 0.5	96	100	92	80	75	80	25	13
atrazine + glyphosate	0.8 + 0.38	79	83	96	100	100	100	29	15
atrazine + glyphosate	0.8 + 0.5	65	98	72	100	100	95	26	13
atrazine + glyphosate	1.0 + 0.38	97	100	96	100	100	100	29	20
atrazine + glyphosate	1.0 + 0.5	100	100	97	90	100	98	29	20
Check	---	0	0	0	0	0	73	23	13
plants/sq ft		*36*	*102*	*119*	*0.1*	*0.1*			

[1] Herbicides applied August 8, 1978. WK surfactant added at a rate of 0.25% v/v water solution.
[2] Visual evaluations May 29, 1979. Plant counts July 21, 1980.
Abbreviations: KO = kochia; LQ = slimleaf lambsquarters; RT = Russian thistle; KW = erect knotweed.
[3] Wheat stand visually evaluated and height measured July 21, 1980. Grain harvested July 28, 1980.

Weed control in fallow-system winter wheat with post-harvest and fall herbicide treatments. Humburg, N. E. and H. P. Alley. Herbicides were applied in August and October to undisturbed soil and wheat stubble. Broadcast applications were made with a knapsack sprayer that delivered 40 gpa of herbicide-water solution. Slimleaf lambsquarters and Russian thistle were 6 to 8 inches tall when herbicides were applied on August 8, 1978. Environmental conditions were as follows: air temperature, 78 F; relative humidity, 28%; wind 5 to 7 mph; partly cloudy; and soil temperatures were 110, 102, 87 and 80 F for the surface and depths of 1, 2 and 4 inches. The soil was sandy loam (65.2% sand, 25.2% silt and 9.6% clay) with pH 5.7 and 1.5% organic matter. Frost occurred prior to the October treatments. High Plains winter wheat was planted in mid-September 1979 with a 14-in row width hoe drill. Treatments were replicated three times, with 9 by 30 ft plots arranged in a randomized complete block design.

Evaluations during the summerfallow season were made on May 31, 1979. Visual control ratings were made for each weed species present. All herbicide treatments totally controlled slimleaf lambsquarters and tansy mustard, with the exception of the fall application of R-40244 at 0.5 lb ai/A. Control of Russian thistle increased as application rates of R-40244 were increased; the additions of atrazine at 0.5 lb ai/A enhanced control.

Six days before harvest weeds were counted. Control of tansy mustard and and erect knotweed occurred where R-40244 was applied at rates of 1.0 or 2.0 lb/A or at 1.0 lb/A tank-mixed with atrazine at 0.5 lb/A. Control of Russian thistle was lacking, except where atrazine was added.

Weeds growing in the crop did not affect wheat stands or yields. Best stands and highest yields occurred where weed control during the summerfallow period was greatest. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1085).

Weed control in fallow-system winter wheat
with post-harvest and fall herbicide treatments

Herbicide[1]	Rate lb/A	Percent Weed Control[2]						Wheat[3]	
		1979			1979			Stand	Yield
		LQ	RT	TM	RT	TM	KW	%	bu/A
Post-harvest (Aug.)									
R-40244	0.5	100	32	100	40	95	95	95	10
R-40244	1.0	100	62	100	70	100	90	92	9
R-40244	2.0	100	96	100	60	100	95	77	14
R-40244 + paraquat	0.5 + 0.25	100	43	100	50	15	65	83	9
R-40244 + paraquat	1.0 + 0.25	100	74	100	60	100	90	83	11
R-40244 + paraquat	2.0 + 0.25	100	93	100	40	95	100	80	11
R-40244 + atrazine	1.0 + 0.5	100	99	100	60	85	100	97	15
Fall (October)									
R-40244	0.5	97	47	98	40	60	80	73	11
R-40244	1.0	100	81	100	80	100	75	77	13
R-40244	2.0	100	93	100	30	100	95	93	14
R-40244 + atrazine	1.0 + 0.5	100	100	100	90	100	100	98	16
Check	---	0	0	0	0	0	0	85	12
plants/sq ft		*71*	*74*	*6*	*0.1*	*0.2*	*0.3*		

[1]Post-harvest: herbicides applied August 8, 1978. Fall: herbicides applied in October 1978.

[2]Visual evaluations May 31, 1979. Plant counts July 22, 1980.
Abbreviations: LQ = slimleaf lambsquarters; RT = Russian thistle; TM = tansy mustard; KW = erect knotweed.

[3]Wheat stand visually evaluated July 22, 1980. Grain harvested July 28, 1980.

Chemical fallow herbicide and tillage trial. Rydrych, D.J. A trial was established on the Pendleton Station in 1977 using herbicides and fall tillage to control volunteer cereals and weeds in wheat stubble during the winter. Preliminary yield data in 1978 had shown that chemical fallow herbicides had resulted in increased yield over the conventional non-treated moldboard plow system. This trial was repeated in the same location in 1979 and yield data was obtained in 1980. Chemical fallow, during the winter months, controls volunteer cereals and grass weeds such as downy brome and prevents a heavy sod formation for spring tillage. A reduction in spring tillage conserves moisture and helps prevent soil erosion. Fall tillage without chemicals was compared with undisturbed chemical plots. Fall herbicides were applied September 8, 1978, in standing wheat stubble prior to the germination of volunteer cereals, downy brome, and broadleaf weeds. A spring chemical treatment was applied March 9, 1979, when volunteer wheat was 1 to 3-leaf, downy brome 3-leaf, and broadleaf weeds were 4 to 6-leaf. Fall tillage plots were disked on October 8, 1978, and left undisturbed until the resumption of spring tillage. The entire plot area was spring plowed and kept weed free during the fallow year by conventional tillage. The area was seeded to winter wheat (variety Stephens) on October 19, 1979, and treated with metribuzin plus bromoxynil (.25 + .25 lb ai/A) for general weed control on March 12, 1980. The yield results were taken from three replications in plots that were 20 ft. by 100 ft. and are recorded in the table.

Fall tillage and fall chemical fallow using cyanazine plus atrazine (3.00 + .33 lb ai/A) increased yield by over 340 lb/A. Spring chemical fallow using glyphosate (.50 lb ai/A) did not increase yield in these tests. Weeds, such as downy brome and broadleaf weeds (blue mustard and tumble mustard), were adequately controlled in all plots although there were a greater number of escapes in the conventional tillage and glyphosate treatments. The results show that chemical fallow can be beneficial as a tillage aid without a decrease in normal yield. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Chemical fallow herbicide and tillage trial at Pendleton, Oregon--1980

Treatment 1/	Rate lb/a	Percent weed control 2/ DB	BL	Crop injury %	Wheat yield lb/A
A. fall disk (fall)	----	90	100	0	5390
B. cyanazine - atrazine (fall)	3.00 + .33	90	100	0	5320
C. glyphosate (spring)	.50	84	100	0	5100
D. conventional tillage (spring)	----	85	100	0	4980

1/ Chemical treatments in stubble (B) fall, September 8, 1978.
Chemical treatment in stubble (C) spring, March 9, 1979.
Fall tillage treatment (A) disk, October 8, 1978.
Conventional plow tillage (D) plus all other chemical treatments on April 18, 1979.
Treatment in crops, March 12, 1980, applied metribuzin + bromoxynil (.25 + .25 lb ai/A) for selective weed control.

2/ Abbreviations: DB = downy brome; BL = broadleaf weeds.

Chemical fallow herbicide screening trial in wheat stubble using propham mixtures. Rydrych, D.J. A field trial in wheat stubble was established on the Pendleton Station in the fall of 1979 to evaluate herbicides that could be used in mixtures with propham. Chemical fallow herbicides are being used in eastern Oregon stubble fields to control volunteer cereals and grass weeds so that tillage can be reduced. Reducing these operations conserves moisture and helps prevent soil erosion. The reduced number of tillage operations helps prevent sod formation and saves the grower time, labor, and fuel costs.

Propham is very active on grass weeds and volunteer cereals but is very weak on broadleaf weeds. Broadleaf herbicides such as diuron, dalapon, terbutryn, and 2,4-D low-volatile ester were combined with propham and evaluated for broad spectrum weed control. The herbicides were applied December 18, 1979, in wheat stubble containing volunteer wheat, downy brome, and broadleaf weeds such as tumble mustard, blue mustard, fiddleneck, and false flax. The trial was evaluated April 17, 1980, and the results are recorded in the table.

Broadleaf weed control was greatly enhanced in propham mixtures containing diuron, terbutryn, and 2,4-D. Downy brome control was not enhanced greatly by the use of propham mixtures but diuron did seem to improve volunteer wheat control. Broad spectrum weed control in chemical fallow can be achieved by the use of propham mixtures containing diuron, terbutryn, and 2,4-D without adverse effect on the parent material. This study confirms test results from other experiments in 1978 and 1979. More tests are planned using propham mixtures. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Chemical fallow herbicide screening trial
in wheat stubble using propham mixtures

Treatment[1/]	Rate lb/A	Percent vegetation control[2/]					
		VW	DB	TM	BM	F	FF
propham	3.00	90	95	20	20	15	0
propham + diuron	3.00 + 1.00	98	96	100	100	98	100
propham + dalapon	2.00 + 4.00	95	88	65	70	70	50
propham + terbutryn	3.00 + 1.00	91	95	80	80	100	80
propham + 2,4-D (LVE)	3.00 + 1.00	93	95	100	100	99	100
check	---	0	0	0	0	0	0

1/ Treated in fall stubble December 18, 1979, at Pendleton, Oregon.

2/ Abbreviations: VW = volunteer wheat; DB = downy brome; TM = tumble mustard; BM = blue mustard; F = fiddleneck; FF = false flax.

Chemical fallow treatments on snow cover in wheat stubble using propham. Rydrych, D.J. A field study was established on the Pendleton Station to determine the effectiveness of propham when applied on snow cover. Propham was applied on a 2-inch snow cover in wheat stubble on November 28, 1979. The soil, volunteer wheat, and weeds were completely covered with snow. A second series of propham and propham mixtures were applied to bare soil on December 14, 1979. Propham was applied at 3 lb ai/A in a volume of 20 gpa and in mixtures with cyanazine and metribuzin at 2 lb ai/A. The results of this test are recorded in the table.

Propham was just as effective on volunteer wheat and downy brome when applied on snow cover as when applied on bare soil and exposed foliage. These data are only preliminary and represent only one season of evaluation. However, the technique may be useful in special situations. More tests are planned for 1981. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Chemical fallow treatments on snow cover in wheat stubble using propham

Treatment 1/	Rate lb/A	Percent weed control 2/		
		VW	DB	BL
1. propham	3.00	93	90	30
2. propham (on snow)	3.00	97	93	35
3. propham + cyanazine	2.00 + 2.00	92	94	30
4. propham + metribuzin	2.00 + .50	80	75	95
5. check	----	0	0	0

1/ Treatment (2) applied on 2-inch snow cover on November 28, 1979. Treatments (1), (3), (4) applied on bare foliage on December 14, 1979.

2/ Abbreviations: VW = volunteer wheat; DB = downy brome; BL = broadleaf weeds (blue mustard, tumble mustard, false flax).

Delayed incorporation of thiocarbamates. Callihan, R.H. and P. W. Leino. Performance of three thiocarbamate herbicides incorporated from 15 minutes to 48 hours after application was investigated to determine whether immediate incorporation was necessary to avoid herbicide loss.

On July 31, 1980 4 lb/A EPTC, vernolate and cycloate were applied to plots on a sprinkler-irrigated Declo sandy loam soil with a 1.09% OM. Treatments were sprayed with a tractor-mounted 12-foot boom delivering 35 gpa. Herbicides were sprayed at 10 a.m. to a dry soil surface. Ambient air temperature was 71 F, soil surface 82 F, and 69 F at six-inch depth.

Incorporation occurred perpendicular to the chemical treatments to a depth of five inches with a power-driven rotary tiller after 15 minutes and 6, 12, 24, 36, and 48 hours. An unincorporated control as well as an untreated control were included in this split plot statistical design. A nighttime rain shower at 11 p.m. beginning 13 hours after the herbicide application moistened the soil surface with 0.1 inches of water. The soil was still moist next morning and the day was clear and warm.

Indicator species were wheat, green foxtail (Setaria viridis), redroot pigweed (Amaranthus retroflexus), previously roto-tilled into the surface six to eight inches. Plant counts were made in square-meter quadrats. Observations indicated that plots roto-tilled 15 minutes, 6 or 12 hours were equally effective. Setaria data show that delaying incorporation for 24 hours resulted in distinctly significant losses in effectiveness, regardless of herbicide. This is also suggested by the Amaranthus and wheat data. The reduction in effectivenss of treatments incorporated after 12 hours may be a result of the rain shower which increased the surface moisture above the normal condensation which commonly occurs in this area of high nighttime radiation. (University of Idaho Research and Extension Center, Aberdeen, ID 83210).

Delayed mechanical incorporation of thiocarbamates

Time of Incorporation	Treatment and rate Eptam 4 lb ai/A	 Vernam 14 lb ai/A	 Ro Neet 4 lb ai/A	Check	Mean
Amaranthus plants/m^2					
15 minutes	3	1	5	14	6
6 hour	3	0	6	10	5
12 hour	1	1	4	10	4
24 hour	7	4	8	9	7
36 hour	8	5	6	12	8
48 hour	8	4	7	13	8
No Incorp.	1	4	4	26	9
Mean	5	3	5	13	6
5% LSD - time = 4.0;	herbicide = 5;		interaction = 14		
Setaria plants/m^2					
15 minutes	4	3	10	131	37
6 hour	3	3	10	101	29
12 hour	3	19	6	69	24
24 hour	21	51	42	101	54
36 hour	40	66	60	122	72
48 hour	25	45	34	120	56
No Incorp.	3	31	26	189	62
Mean	14	31	27	119	48
5% LSD - time = 20;	herbicide = 38;		interaction = 101		
Wheat plants/m^2					
15 minutes	0	0	1	16	4
6 hour	0	0	0	13	3
12 hour	1	0	0	11	3
24 hour	1	4	4	8	4
36 hour	1	3	3	15	5
48 hour	2	2	3	10	4
No Incorp.	12	13	13	22	15
Mean	2	3	3	14	6
5% LSD - time = 5;	herbicide = 4;		interaction = 10		

Annual broadleaf and grass weed control in spring wheat. Humburg, N. E., H. P. Alley and D. F. Ernst. Plots were established at the Torrington Research and Extension Center to evaluate several individual herbicides and/or combinations for their effectiveness for control of annual broadleaf and grass weeds in spring wheat (variety Olaf). Herbicides were applied May 30, 1980, with a 6-nozzle knapsack calibrated to deliver 40 gpa solution to plots 9 by 30 ft arranged in a randomized complete block with three replications. Environmental conditions were: clear sky, air temperature 61F, relative humidity 58%, soil temperature 90, 79, 67 and 59F at the soil surface and 1, 2 and 4-inch depths, respectively. The soil was a sandy loam (65.2% sand, 23.0% silt and 11.8% clay) with 1.5% organic matter and a pH of 7.1. Weed species and stage of growth at time of treatment were: common lambsquarters: cotyledon to 8 leaf/0.5 to 1.5 in; green foxtail: 0-2 tillers/2 to 4 leaf/0.5 to 2 in; redroot pigweed: cotyledon to 4 leaf/0.5 to 1.5 in; hairy nightshade: cotyledon to 6 leaf/0.25 to 1 in; common purslane: cotyledon to 2 leaf/0.25 to 0.5 in. Irrigation was by a lateral move, low pressure sprinkler.

Weed control and crop stand evaluations were made July 18, 1980, by counting all weeds and crop stand in 6 sq ft per plot. Crop yield was determined by harvesting each plot, threshing, and computing to bu/A. All treatments, either as individual herbicides or combinations, gave 92 to 100% control of common lambsquarters and redroot pigweed, except R 40244 appeared weak on these two weed species giving incomplete control. DPX 4189, metribuzin 75DF, metribuzin/hexazinone, hexazinone and R 40244 exhibited excellent activity on common purslane. However, these treatments delayed maturity of the spring wheat by 0.3 to 6.3 days. Hexazinone, metribuzin 75DF at the 0.3 lb ai/A and the combination of metribuzin/hexazinone were the only treatments exhibiting control potential of the grassy weeds, green foxtail and stinkgrass. DPX 4189, although not killing the grass, reduced the height considerably. Yields ranged from 50.9 bu/A for the check to a low of 29.1 bu/A where metribuzin 75DF/hexazinone was applied to 67.5 bu/A where bromoxynil/2,4-D amine was used. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1072).

Weed control, spring wheat stand and yields

Herbicides	Rate lb ai/A	Percent Control[1] LQ	PW	PU	GF	SG	Crop Stand	Maturity Days Delay	Yield bu/A
DPX 4189 80WP	0.0156	100	100	100	21	0	97	0	62.3
DPX 4189 80WP	0.031	100	100	100	60	59	95	0.3	56.9
DPX 4189 80WP	0.062	100	100	100	64	36	85	0.3	54.0
metribuzin 75DF	0.2	100	100	100	36	41	88	3.0	51.7
metribuzin 75DF	0.3	100	100	100	54	95	85	3.3	48.4
metribuzin 75DF/hexazinone 2E	0.25 + 0.2	100	100	100	99	95	47	6.3	29.1
hexazinone 2E	0.2	97	98	100	96	91	60	5.3	41.6
bromoxynil	0.5	100	96	0	21	14	100	0.3	58.6
bromoxynil/2,4-D amine	0.38 + 0.38	100	100	10	50	18	97	0.3	67.5
bromoxynil/MCPA	0.38 + 0.38	100	100	10	29	18	97	0.7	62.8
bromoxynil/diclofop	0.38 + 0.75	100	100	0	54	23	97	0.3	58.9
AXF 1050 4EC/metribuzin 4F	0.25 + 0.125	100	98	90	12	41	93	1.0	54.6
AXF 1050 4EC/metribuzin 4F	0.25 + 0.25	100	100	100	43	77	80	4.0	49.0
AXF 1053 3EC	0.38	100	100	90	18	23	83	2.3	53.6
AXF 11-24 45WP	1.0	92	100	30	20	5	93	0.7	57.1
AXF 11-24 45WP	2.0	94	100	30	23	5	85	3.0	48.4
AXF 11-24 45WP	3.0	97	100	10	52	27	88	1.3	49.1
AXF 11-25 5.33EC	2.0	100	100	40	68	18	88	2.0	57.1
R 40244 2E	0.25	92	72	100	62	0	87	1.3	57.1
R 40244 2E	0.5	100	85	100	50	50	85	1.7	56.1
R 40244 2E	1.0	100	96	100	71	45	88	3.3	48.6
Check	---	---	---	---	---	---	87	4.0	50.9
plants/ft^2		*2.0*	*2.6*	*0.6*	*5.1*	*1.2*			

[1]Abbreviations: LQ = common lambsquarters; PW = redroot pigweed; PU = common purslane; GF = green foxtail; SG = stinkgrass.

Evaluation of annual broadleaf and grass herbicides for weed control and crop phytotoxicity in spring wheat. Humburg, N. E., H. P. Alley and D. F. Ernst. Plots were established at the Torrington Research and Extension Center to evaluate new, promising individual herbicides and/or combinations for their effectiveness for control of annual broadleaf and grass weeds and selectivity in spring wheat (variety Olaf). Herbicides were applied June 10, 1980, when the spring wheat was in the 3 to 5 leaf/5 to 10 inch height and the weeds were: green foxtail: 1 to 3 tillers/3 to 5 leaf/1.0 to 2.5 in; redroot pigweed: cotyledon to 5 leaf/0.1 to 2.0 in; hairy nightshade: cotyledon to 6 leaf/0.5 to 1.5 in; common purslane: cotyledon to 3 leaf/0.5 to 1.0 in growth. Air temperature was 80 F, relative humidity 35%, soil temperature 84, 82, 82 and 80 F at the soil surface and 1, 2 and 4 inch depths, respectively, at time of treatment. Soil was a sandy loam (59.6% sand, 23.0% silt and 12.4% clay) with 0.7% organic matter and a pH of 7.3. All treatments were applied with a 6-nozzle knapsack calibrated to deliver 40 gpa solution to plots 9 by 30 feet, arranged in a randomized complete block with three replications.

Weed control and crop stand evaluations were made July 17, 1980, by counting all weeds and crop stand in 6 sq ft per plot. No individual herbicide and/or combination gave effective control of green foxtail. The most effective treatment on the broadleaf weed spectrum was dicamba/M 3972. Other treatments appeared weak on one or more of the species. Metribuzin 4F and metribuzin 75% sprayule at the 0.38 lb ai/A reduced the stand of wheat to 30 and 50% of the check; respectively. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1073).

Weed control, crop stand, height and maturity

Herbicides[1]	Rate lb ai/A	Crop[2]			Weed Control[2,4]				
		Stand %	Height in	Delay[3] Maturity	LQ	PW	NS	PU	GF
metribuzin 4F	0.25	73	33	2.7	89	78	78	100	11
metribuzin 4F	0.38	30	27	4.3	100	100	34	100	0
metribuzin 75% sprayule	0.25	73	32	3.0	100	78	56	100	0
metribuzin 75% sprayule	0.38	50	28	3.3	100	89	78	100	0
diclofop 3EC	0.75	100	35	1.3	44	0	0	43	17
diclofop 3EC	1.0	97	37	0.3	39	12	11	71	14
diclofop 3EC/M 3972 3EC	0.75 + 0.125	78	32	1.7	89	89	78	64	43
dicamba/M 3972 3EC	0.062 + 0.125	98	35	1.0	83	100	100	100	34
dicamba/M 3972 3EC	0.125 + 0.125	95	33	1.3	100	78	100	79	6
dicamba/MCPA	0.062 + 0.25	95	33	1.7	100	100	45	57	0
dicamba/MCPA	0.125 + 0.25	95	33	1.7	100	89	100	57	0
propanil 3EC	1.12	90	31	3.0	83	78	89	0	0
propanil 3EC	1.5	80	33	3.0	78	56	78	21	36
propanil 3EC/MCPA	1.12 + 0.25	88	31	3.0	94	67	45	7	0
propanil 3EC/MCPA	1.5 + 0.25	82	30	4.0	100	89	78	36	0
Check	---	100	33	0.3	0	0	0	0	0
plants/ft^2					*1.0*	*0.5*	*0.5*	*0.8*	*1.9*

[1]Herbicides applied June 10, 1980.
[2]Weed counts and crop stand evaluations July 17, 1980.
[3]Days delay of crop maturity.
[4]Abbreviations: LQ = common lambsquarters; PW = redroot pigweed; NS = hairy nightshade; PU = common purslane; GF = green foxtail.

Timing of application of DPX 4189 on winter wheat. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. DPX 4189 was applied at 0.06 lbs/A to 'Stephens' winter wheat at five growth stages in western Oregon. The wheat was planted on October 15, 1979 and harvested on August 1, 1980. The experimental design was a Latin square with six replications and 8 by 25 ft plots. The soil was a Woodburn silt loam with 2.4% organic matter and 5.2 pH.

Wheat yields in all postemergence timings were lower than in the preemergence timing (see table below). Since this rate of DPX 4189 results in severe crop rotation problems because of excess soil residues, practical rates of application in western Oregon are 0.02 lbs/A and lower. (Crop Science Department, Oregon State University, Corvallis 97331)

Winter wheat grain yield
from DPX 4189 at 0.06 lbs/A
applied at five growth stages

Stage of wheat growth		Wheat grain yield (bu/A)
Preemergence	October 16	105.6
2 leaf	November 9	95.3
1 tiller	December 5	97.4
5-10 tiller	March 11	95.4
2 node	April 3	96.3
Check		103.6
	$LSD_{.05}$	7.5

Postemergence herbicides for control of broadleaf weeds in wheat. Norris, R.F., T.E. Kearney, L.D. Clement, and R.A. Lardelli. Two trials were established in the late winter to evaluate the efficacy of DPX-4189 in comparison with bromoxynil and/or 2,4-D for postemergence annual broadleaf weed control. The experiments were located on private farms; one was in Yolo County, and the other was in Solano County. The wheat was grown using rainfall only. The plot size was 4.8 by 7.3 m at the Yolo County location; herbicides were applied with a CO_2 backpack sprayer delivering 380 l/ha of spray. The plot size at the Solano County location was 0.75 by 7.5 m; herbicides were again applied with a CO_2 backpack sprayer, but calibrated to deliver 190 l/ha. Treatment date was February 29, 1980 at the Yolo County trial, and was February 10, 1980 at the Solano County location. Both trials were replicated four times. All treatments were applied when the crop was in the three to six leaf growth stage, at which time the weeds ranged from 5 to 15 cm tall.

Plots treated with DPX-4189, at all three rates tested, showed excellent broad spectrum weed control. Wild oats were not controlled by DPX-4189. Bromoxynil demonstrated its characteristic weakness against common chickweed and redstem filaree at the Yolo County location; both bromoxynil and 2,4-D performed well at the Solano County trial. Wheat tolerance to all herbicides was good; some early vigor reductions due to DPX-4189 were noted at the Yolo County location, but these were rapidly outgrown. DPX-4189 appears to offer broadleaved weed control in wheat that is equal or superior to that provided by bromoxynil of 2,4-D. (Botany Department, University of California, Davis, CA 95616)

Evaluation of postemergence broadleaf weed control in wheat

Weed Species	DPX-4189 0.017[1/]	DPX-4189 0.035	DPX-4189 0.070	Bromoxynil 0.6	2,4-D 0.8	Untreated check
Yolo County Trial (assessed 4/9/80)						
Crop injury[2/]	2.0[3/]	2.0	2.7	0.4	-	0.0
Crop injury	0.0	0.0	0.0	0.0	-	0.0
Coast fiddleneck	8.2	9.3	9.2	10.0	-	0.0
Common chickweed	9.3	10.0	10.2	0.7	-	0.0
Redstem filaree	7.4	8.2	8.5	0.0	-	0.0
Groundsel	7.7	9.2	9.3	10.0	-	0.0
Solano County trial (assessed 3/19/80)						
Crop injury	0.0	0.0	0.0	0.0	0.0	0.0
Groundsel	8.5	10.0	9.8	9.8	7.8	0.0
Common chickweed	10.0	10.0	10.0	8.8	7.5	1.8
Corn spurry	9.8	9.8	9.8	7.5	9.0	3.8
Yellow starthistle	9.0	9.3	9.3	10.0	10.0	0.0
Wild oats	0.0	2.0	2.5	0.0	3.0	0.0

1/ Herbicide rates expressed in kg/ha.

2/ Early crop injury evaluation made 3/18/80.

3/ Evaluations made on scale of 0 = no effect, 10 = complete kill.

Efficacy and carry-over of herbicides for winter annual weed control in wheat. Norris, R. F., R. A. Lardelli, and D. Ayres. This experiment was established to evaluate the efficacy of DPX-4189, applied preemergence or postemergence, for control of winter annual weeds in wheat. Successive crop plantings were made after wheat harvest to assess herbicide carry-over. The trial was drill seeded with wheat (cv Anza) on Nov. 28, 1979; seeds of common mustard and coast fiddleneck were seeded at the same time. The plots were 5.0 by 7.3 m, replicated three-fold, and arranged in a completely randomized block design. All treatments were applied with a CO_2 backpack sprayer using 380 l/ha of water. Preemergence treatments were applied directly following seeding. Bromoxynil was applied at the three-leaf stage of growth of the wheat, and the 2,4-D and postemergence DPX-4189 were applied at the tillered stage of growth of the wheat. The experiment received 7.5 cm of rain by late January; irrigations were applied at heading to assure adequate growth and yield. The plot area received 67.0 kg/ha of nitrogen. Other weeds that emerged in the plot area included henbit, common chickweed, and annual bluegrass. The wheat was harvested on July 15, 1980.

Immediately following harvest the straw was shredded and the area rototilled. Beds were then listed and shaped and the test crops sowed. These were furrow irrigated as required. Due to the excessive quantity of straw tilled into the soil the crops became nitrogen deficient and a further 110 kg/ha of nitrogen was added. After evaluations of crop growth on Sept. 2, 1980 the tops of the beds were again tilled, and a second planting of the crops was made. These were again furrow irrigated as required. Evaluations of crop growth were made on Oct. 10, 1980.

Broadleaf weed control was essentially 100 % for the postemergence treatments of DPX-4189; all rates investigated were equally effective. The preemergence treatments of DPX-4189 were slightly less effective (Table 1). 2,4-D and bromoxynil also provided very good broadleaf weed control, but the wheat yield from the 2,4-D plots was lower than for the other herbicide treatments; this was attributed to a moderate level of injury caused by the 2,4-D to the crop.

Evaluations of the growth of crops planted following wheat harvest showed no residual activity from either 2,4-D or bromoxynil, but plots treated with DPX-4189 showed varying levels of crop suppression (Table 2). Tomato, cucumber, and cotton appeared to show good tolerance to DPX-4189, especially by the second planting; onions, alfalfa, sugarbeets, and carrots were very sensitive to the herbicide. DPX-4189 provided weed control that was superior to that provided by currently registered herbicides, but did persist long enough in the soil to injure subsequent crops. (Botany Department, University of California, Davis, CA 95616).

Table 1. Effect of herbicides for selective annual broadleaf control in wheat.

Herbicide	kg/ha	Wheat injury 2/27/80	Weed control Mustard	Other weeds	Wheat yield kg/ha 7/15/80
			----- 2/27/80	------	
Preemergence (12/3/79)					
DPX-4189	0.017	0.7	7.5	9.2	8073c
DPX-4189	0.035	0.2	7.8	10.0	8126c
Postemergence (1/21/80)					
Bromoxynil	0.6	0.5	9.8	7.7	8216c
Postemergence (1/31/80)					
DPX-4189 + X-77	0.017	0.3	10.0	9.8	8028c
DPX-4189 + X-77	0.035	1.5	10.0	10.0	8014c
DPX-4189 + X-77	0.070	1.0	10.0	10.0	7790c
2,4-D amine	1.1	0.7	10.0	7.2	6862b
Untreated check	-	0.0	0.0	0.0	6099a

Data are visual ratings; 0 = no effect, 10 = complete kill. Data within column followed by same letter do not differ significantly at p = 0.05 level.

Table 2. Effect of herbicides applied to wheat on growth of subsequent crops

Crop	Planting date	DPX-4189 0.017[1]	DPX-4189 0.035	Bromoxynil 0.6	DPX-4189 0.017	DPX-4189 0.035	DPX-4189 0.070	2,4-D 1.1	Untreated check
		-- 12/3/79 -		1/21/80	--------- 1/31/80 -------				
Onion	7/23/80	2.0[2]	5.3	0.0	4.3	7.0	10.0	3.3	0.7
	9/9/80	1.0	2.3	0.7	7.3	9.0	8.3	0.3	1.0
Alfalfa	7/23/80	1.7	5.3	0.0	1.7	2.5	3.8	0.3	0.0
	9/9/80	2.7	3.3	2.7	6.3	7.3	5.7	0.7	2.3
Sugar beet	7/23/80	1.7	3.7	0.3	4.7	5.0	5.3	0.3	0.3
	9/9/80	2.2	2.7	0.0	4.0	7.3	7.7	0.0	1.7
Tomato	7/23/80	2.3	1.8	0.7	1.3	1.5	4.0	2.0	0.7
	9/9/80	1.7	1.8	1.7	1.2	0.3	3.3	1.0	1.3
Carrots	7/23/80	2.0	0.3	1.0	5.0	3.8	8.0	1.3	1.7
	9/9/80	1.5	2.7	1.0	1.7	4.3	4.7	2.0	1.5
Cucumber	7/23/80	2.3	5.5	4.0	3.8	4.0	6.2	2.3	3.0
	9/9/80	0.3	0.7	0.3	0.0	0.3	1.0	1.0	1.0
Cotton	7/23/80	0.2	0.5	0.3	0.5	1.5	4.0	0.2	0.7
	9/9/80	1.3	1.7	1.0	1.3	1.3	3.0	1.7	2.0
Kidney bean	7/23/80	2.2	2.7	0.5	2.3	1.7	3.0	1.0	1.7
	9/9/80	-	-	-	-	-	-	-	-
Lettuce	7/23/80	-	-	-	-	-	-	-	-
	9/9/80	3.3	4.0	2.3	3.3	4.0	4.0	1.0	1.0
Sorghum	7/23/80	3.5	1.5	0.3	2.3	5.0	6.0	1.2	0.3
	9/9/80	1.2	2.0	1.7	1.3	5.7	5.2	1.7	2.0
Corn	7/23/80	4.0	2.5	0.0	3.7	7.0	6.3	0.7	0.0
	9/9/80	3.0	2.3	1.7	1.5	6.3	4.7	2.0	2.8

[1] Rates of herbicides expressed in kg/ha.
[2] Evaluations based on scale of 0 = no effect, 10 = complete kill.
Data for kidney beans on 9/9 planting missing due to severe damage from rabbits.
Data for lettuce for 7/23 planting missing due to lack of germination in warm weather.

Selective downy brome control in winter wheat using diclofop methyl. Rydrych, D.J. Downy brome is a serious competitor in the dryland winter wheat and winter barley areas of eastern Oregon. Areas that practice trashy fallow or reduced tillage have particular problems with downy brome and soil incorporated herbicides are often inactivated by the straw on these surfaces. Diclofop methyl has been tested in eastern Oregon since 1978 for selective downy brome control in winter wheat. The 1980 trials were established at Pendleton, Alicel, Ione, Holdman, Echo, and Lostine, Oregon, in areas of both plow and stubble mulch cultures. Each plot was 10 ft. by 20 ft. and replicated three times. TeeJet 8002 flat fan nozzles at 30 psi boom pressure were used with a volume of 20 gpa at all locations. Diclofop methyl was preplant soil incorporated twice in the fall of 1979 using a flextine harrow and rod weeder to an average depth of 2 inches. The silt loam soil was dry at the surface for excellent incorporation but moist enough at deeper depths for good wheat seed germination. Visual evaluations were taken in the spring of 1980 and are recorded in the table.

Diclofop methyl was applied at 1 lb ai/A and averaged over 94% control of downy brome in winter wheat. Broadleaf weeds must be controlled with other herbicides for broad spectrum control. Tests in 1978 and 1979 showed that diclofop methyl was highly active on downy brome if it was soil incorporated. Postemergence applications are not effective. This material has given excellent results on downy brome in both clean and straw covered seedbeds. In addition, it has excellent selectivity in winter cereals. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Selective downy brome control in winter wheat at six locations in eastern Oregon using diclofop methyl--1980

Locations1/	% Downy brome control2/				Crop injury
	R1	R2	R3	Ave.	%
Pendleton (plow)	96	94	94	95	0
Pendleton (stubble mulch)	98	99	100	99	0
Alicel (plow)	100	99	90	96	0
Ione (stubble mulch)	96	98	92	95	0
Holdman (stubble mulch)	92	96	96	94	0
Echo (stubble mulch)	99	98	99	99	0
Lostine (plow)	99	98	97	98	0

1/ Tillage culture either moldboard plow or stubble mulch.

2/ Diclofop methyl (1.00 lb ai/A) applied preplant incorporated.

Selective downy brome control in winter wheat using DPX 4189. Rydrych, D.J. Preliminary tests in 1979 showed that DPX 4189 was moderately effective for selective downy brome control in winter wheat if the materials were preplant incorporated. The 1979 trials were established on 9 locations. Additional tests were conducted in 1980 at several locations in eastern Oregon to determine the potential of DPX 4189 as a downy brome herbicide. Field trials were established at Pendleton, Alicel, Ione, Holdman, Echo, and Lostine, Oregon. Each plot was 10 ft. by 20 ft. and replicated three times in a randomized complete block design. Flat fan 8002 TeeJet stainless steel nozzles at 30 psi boom pressure were used to obtain a volume of 20 gpa at all locations. DPX 4189 was preplant soil incorporated twice in the fall of 1979 using a flextine harrow and rod weeder. Depth of incorporation was limited to an average of 2 inches in a silt loam soil that was dry on the surface but moist enough at deeper depths for good wheat seed germination. Visual evaluations were taken the following spring and are recorded in the table.

DPX 4189 showed a great deal of activity on downy brome at rates of .12 and .25 lb ai/A in these tests. However, injury evaluations showed that DPX 4189 @ .25 lb ai/A was causing some wheat injury. The Echo site was seeded very shallow (1-inch) and considerable injury was recorded. These tests showed that DPX 4189 has some activity on downy brome but rates that are effective may cause some crop injury. Sites which were seeded at depths of 2 to 3 inches did not have the severe injury symptoms that were found at Echo. DPX 4189 rates which are adequate for broadleaf control (.06 lb ai/A) would not be effective on downy brome. DPX 4189 was also applied postemergence at all 6 sites but gave very little downy brome control. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Selective downy brome control in winter wheat at six locations in eastern Oregon using DPX 4189

	% Downy brome control 2/			Crop 3/
Locations 1/	DPX 4189 .06	DPX 4189 .12	DPX 4189 .25	Injury %
Pendleton (Plow)	40	60	60	0
Pendleton (Stubble Mulch)	50	70	65	0
Alicel (Plow)	70	50	80	1
Ione (Stubble Mulch)	30	60	80	0
Holdman (Stubble Mulch)	20	40	85	2
Echo (Stubble Mulch)	70	65	90	25
Lostine (Plow)	30	50	90	1

1/ Tillage culture either moldboard plow or stubble mulch.

2/ DPX 4189 treatments applied preplant soil incorporated.

3/ Crop injury as reduced vigor was only evident @ DPX 4189 rates of .25 lb ai/A.

Selective ivyleaf speedwell control in winter wheat. Rydrych, D.J. A study was established at Weston, Oregon, in 1980 to determine the proper herbicide for speedwell control in winter wheat (variety Stephens). Metribuzin, dinoseb, and DPX 4189 were applied postemergence on February 27, 1980, when speedwell was in the 4 to 8 leaf stage and winter wheat had 4 to 5 leaves. Each plot was 8 ft. by 20 ft. and replicated three times in a randomized complete block design. Flat fan 8002 TeeJet stainless steel nozzles and 30 psi boom pressure was used to obtain the proper distribution and volume. Temperatures at the time of application averaged 67 F with a relative humidity of 62%. Visual evaluations were taken on June 16, 1980.

Excellent speedwell control was obtained with metribuzin at .33 lb ai/A and fair control with dinoseb at 1.5 lb ai/A with excellent crop safety for both materials. DPX 4189 gave poor control of speedwell at .12 lb ai/A in these tests. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Postemergence herbicides for speedwell control in winter wheat at Weston, Oregon

Treatment 1/	Rate lb/A	Speedwell control %	Crop 2/ injury %	Yield lb/A
check	----	0	0	4380
metribuzin	.33	100	0	5280
metribuzin	.50	100	5	5060
dinoseb	1.50	75	0	5370
DPX 4189	.12	67	0	4780
weeded check	----	100	0	5360

1/ Herbicides applied February 27, 1980.

2/ Crop injury as vigor reduction.

Wild oat control in winter wheat. Rydrych, D.J. A trial was established at Cove, Oregon, in 1980 to determine the proper timing for wild oat control in winter wheat (variety McDermid). SD 45328, diclofop methyl, and difenzoquat were applied postemergence on April 29, 1980, when wild oats were 3 leaf and again on May 13, 1980, when wild oats were 5 to 8 leaf. Winter wheat was 4 to 6 tiller on April 29, 1980, and 6 to 8 tiller on May 13, 1980. Each plot was 8 ft. by 20 ft. and replicated three times in a randomized complete block design. Flat fan 8002 TeeJet stainless steel nozzles at 30 psi boom pressure were used to obtain a volume of 20 gpa. Temperatures at the time of application averaged 73 F with a humidity of 39% on April 29 and 64 F at 60% humidity on May 13. Visual evaluations were taken on June 10, 1980.

SD 45328 at .20 to .80 lb ai/A and difenzoquat at 1 lb ai/A were both more effective on wild oat when applied on the last treatment date (May 13, 1980). Diclofop methyl gave good wild oat control on the early date. SD 45328 and difenzoquat had good crop safety at all rates. However, SD 45328 at .80 lb ai/A showed some visual winter wheat injury and was expressed as mild vigor reduction. (Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Wild oat control in winter wheat at Cove, Oregon--1980

Treatment[1/]	Rate lb/A	Wild oat control %	Crop injury %	Wheat yield lb/A
SD 45328 (April)	.20	60	0	3850
SD 45328 (April)	.40	50	0	3990
SD 45328 (April)	.80	80	1	4520
difenzoquat (April)	1.00	60	0	4120
diclofop methyl (April)	1.25	92	0	4400
SD 45328 (May)	.20	80	0	4550
SD 45328 (May)	.40	98	0	4770
SD 45328 (May)	.80	98	4	4370
difenzoquat (May)	1.00	94	0	4260
check	----	0	0	3890

1/ Treatments--postemergence on April 29, 1980, and May 13, 1980.

Effects of DPX-4189 compared to terbutryn on yield and weed vigor in winter wheat. Sampson, T. C., G. A. Lee and D. C. Thill. This study was initiated at two locations in Latah County to evaluate the effectiveness of post-emergence applications of DPX-4189 compared to terbutryn treatments which were applied at location I to winter wheat (var. Luke) on April 16, May 3, and May 17, 1980 and at location II to winter wheat (var. Hysslop) on April 18, May 3 and May 17, 1980. Treatments at both locations were DPX-4189 at .014 kg a.i./ha, .028 kg a.i/ha and .056 kg a.i./ha and terbutryn at 1.35 kg a.i./ha. Herbicides were applied with a knapsack sprayer equipped with three 8002 teejet nozzles calibrated to deliver 75.7 l/ha. Plot size was 2.74 m by 9.14 m. Treatments were arranged factorially in a randomized complete block design. Location I had three replications and location II had four replications. Visual evaluations were taken on June 11, 1980 at location I and June 18, 1980 at location II. Yield data was obtained after harvesting an area approximately 1.37 m by 8.38 m with a Hege small plot combine.

Terbutryn tended to reduce yield at all dates of application at both locations (tables 1 and 2). The early date of application was generally most effective for both herbicides. (University of Idaho, Moscow, Idaho 83843).

Table 2 Effect of DPX-4189 and Terbutryn on Weed Vigor and Yield and location II

Treatment	Rate kg ai/ha	Date	% Vigor Reduction: Ivyleaf speedwell	Henbit	Mayweed	Field penny-cress	Prickly lettuce	*Epilobium* sp.	Yield kg/ha
DPX-4189	.014	April 18	12.5	25.0	62.5	75.0	100.0	100.0	59.7
		May 3	0.0	2.5	2.5	17.5	30.0	52.5	61.2
		May 17	0.0	30.0	27.5	12.5	47.5	32.5	52.7
DPX-4189	.028	April 18	0.0	30.0	75.0	100.0	100.0	100.0	59.3
		May 3	0.0	25.0	60.0	50.0	42.5	40.0	57.2
		May 17	0.0	5.0	20.0	27.5	32.5	37.5	49.3
DPX-4189	.056	April 18	25.0	50.0	100.0	100.0	100.0	100.0	61.6
		May 3	0.0	30.0	55.0	67.5	55.0	25.0	67.9
		May 17	0.0	0.0	35.0	27.5	42.5	42.5	54.6
Terbutryn	1.35	April 16	100.0	100.0	75.0	100.0	100.0	100.0	49.7
		May 3	45.0	95.0	27.5	52.5	50.0	50.0	41.5
		May 17	95.0	95.0	27.5	20.0	100.0	100.0	40.4
		LSD	16.0	25.5	22.6	18.7	20.5	22.2	6.6

Broadleaf weed control in winter wheat using post applied herbicides. Schumacher, W. J., G. A. Lee, and D. C. Thill. A study was initiated at Waha, Idaho to evaluate post applied herbicides for broadleaf weed control in winter wheat (variety Walladay). Treatments were applied on April 10, 1980 using a knapsack sprayer calibrated to deliver 378.5 l/ha. Air temperature was 15.5 C and soil temperature was 10.5 C at 10 cm. Wheat plants were in the 3-leaf and tillering stage of growth containing secondary roots 2 to 5 cm long, at the time of application. Broadleaf weeds present were 5 to 10 cm tall. The experimental design was a randomized complete block with 3 replications and individual plots were 2.7 m by 9.1 m. Visual evaluations were taken June 17, 1980 and the plots were harvested August 13, 1980.

Dicamba alone controlled catchweed bedstraw, but did not effectively control tansy mustard and wild carrot. Increased control was observed when dicamba was tank mixed with 2,4-D and MCPA, but this increased control was equivalent to either 2,4-D or MCPA alone. Plots treated with DPX-4189 and M-3785 adequately controlled wild carrot and tansy mustard, but not catchweed bedstraw. SAN-315 only adequately controlled tansy mustard.

All herbicides, except terbutryn, yielded greater than the check, although not all differences were statistically significant. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Evaluation of herbicides for broadleaf weed control in winter wheat at Waha, Idaho 1980

Treatment	Rate kg/ha	% Stand Reduction: Crop[2]	Wild Carrot	Tansy Mustard	Catchweed Bedstraw	Yield kg/ha
check	-	0d[1]	0g	0d	0f	2313ef
terbutryn	1.68	73a	83abc	0d	85ab	2115f
dicamba	.14	27cd	13g	30bc	93a	4097a-d
dicamba	.28	0d	7g	80a	100a	5154abc
dicamba + bromoxynil	.07 + .28	60ab	20fg	7cd	90a	3767cde
dicamba + bromoxynil	.14 + .28	27cd	7g	37bc	100a	5088abc
dicamba + 2,4-D	.15 + .42	0d	0g	100a	80ab	5352ab
dicamba + 2,4-D	.20 + .56	0d	23efg	100a	97a	5551a
dicamba + MCPA	.20 + .28	0d	20fg	98a	100a	5286abc
dicamba + MCPA	.14 + .42	0d	53cde	99a	97a	5419a
2,4-D amine	.56	30cd	0g	100a	3f	4031a-d
bromoxynil	.28	70a	0g	0d	80ab	2445ef
MCPA	.42	27cd	50def	93a	0f	4031a-d
DPX-4189	.02	0d	100a	100a	37de	5154abc
DPX-4189	.04	0d	98a	100a	63bc	5485a
DPX-4189	.07	0d	100a	100a	57cd	4758a-d
M-3785	.14	13cd	62bcd	87a	0f	4692a-d
M-3785	.28	30cd	88ab	95a	0f	4031a-d
M-3785	.42	20cd	90ab	100a	0f	4493a-d
SAN-315	.84	63ab	3g	30bc	0f	3304def
SAN-315	1.68	37bc	10g	83a	0f	3700cde
SAN-315	3.36	17cd	17g	98a	20ef	5088abc

1) Means followed by the same letter(s) are not significantly different at .05 level according to Duncan's Multiple Range Test.

2) Percent crop stand reduction due to weed competition not to phytotoxicity of herbicides.

Comparison of preplant incorporated and post applied herbicides for ripgut brome control in winter wheat. Schumacher, W. J., G. A. Lee, and D. C. Thill. A study was initiated at Waha, Idaho to compare preplant and post applied herbicides for ripgut brome control in winter wheat (variety Peck). Preplant incorporated treatments were applied on October 11, 1979. Air and soil temperature at time of application were 28 C and 15 C at 10 cm, respectively. Post applied herbicides were applied on April 22, 1980 when the wheat plants were 20 cm tall and exhibited secondary roots 5 to 8 cm long. Air and soil temperature at time of application were 12 C and 12 C at 10 cm, respectively. Relative humidity at the time of the post application was 88%. All treatments were applied with a knapsack sprayer calibrated to apply 189.2 l/ha for the preplant treatment and 378.5 l/ha for the post treatments. Incorporation was accomplished using a tandem disk pulled twice over the area at right angles to each other and at a speed of 8 kmph. The experimental design was a randomized split block with 3 replications and individual plots 2.74 m by 9.14 m. Visual evaluations were taken June 17, 1980 and the plots were harvested August 21, 1980.

There was no decisive control of ripgut brome at the time visual observations were conducted, with the exception of plots treated with diclofop-methyl at 1.4 kg ai/ha. This treatment controlled ripgut brome approximately 80% (data not shown). All treated plots yielded greater than the check, except plots treated with propachlor at 1.1 kg ai/ha. Diclofop-methyl applied at 1.4 kg ai/ha yielded the highest of all herbicide treatments evaluated. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843).

Effects of herbicides on yields of winter wheat infested with ripgut brome at Waha, Idaho, 1980

Treatment	Rate kg/ha	Type of Application	Yield kg/ha
check	0	-	538 ef[1]
metribuzin + DPX-4189	.42 + .03	Post	1008 cdef
metribuzin	.42	Post	1210 cde
metribuzin	.56	Post	1478 bcd
metribuzin + PPG-225	.28 + .56	Post	874 def
metribuzin + PPG-225	.31 + .56	Post	1075 cdef
metribuzin (50% WP)	.42	Post	1478 bcd
diclofop methyl	1.12	PPI	2083 b
diclofop methyl/metribuzin	1.12/.31	PPI/Post	1680 bc
diclofop methyl/DPX-4189	1.12/.03	PPI/Post	1277 cd
diclofop methyl/DPX-4189	1.12/.07	PPI/Post	1210 cde
diclofop methyl/PPG-225	1.12/.56	PPI/Post	1210 cde
diclofop methyl/PPG-225	1.12/1.12	PPI/Post	739 def
diclofop methyl	1.4	PPI	3158 a
propachlor	1.12	PPI	403 f
propachlor	2.24	PPI	605 ef
propachlor	3.36	PPI	672 def

[1] Means followed by the same letter(s) are not significantly different at the .05 level according to Duncan's multiple range test.

Bioassay of DPX 4189 soil residues in western Oregon. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Soil samples were collected on August 29, 1979 from a winter wheat trial in which DPX 4189 had been applied at five rates on March 14, 1979. The soil was a Woodburn silt loam with a 5.0 pH and a 2.9% O.M.

Soil samples were collected at depths of 0 to 4 inches and 4 to 8 inches and were placed in a freezer at 10°F until October 21, 1979. On October 22, the soil was placed in 4 by 4-inch plastic pots in a greenhouse.

Ten alfalfa (DuPuits) seeds were planted in each pot. After emergence, the stand was thinned to the two largest plants in each pot. The pots were subirrigated and the temperature was maintained at 70°F day and 55°F night.

On November 9, 1979, the length of the unifoliolate leaf petioles and the fresh weights were measured.

The experiment was conducted twice, with five replications in each experiment in a randomized complete block design.

The field trial was moldboard-plowed in November 1979 to a depth of 6 inches. In May, 1980, the trial was disked and planted to 'Giant Western' sugarbeets on May 9. The trial was irrigated three times after planting with a total of 3 inches of water. In addition to the irrigation, 51.3 inches of precipitation fell on the experimental area between the date of treatment and harvest on July 7, 1980. Stand counts of sugarbeet plants were made and foliage fresh weights were obtained by harvesting the sugarbeets at the soil surface.

Growth reduction in the greenhouse bioassay was most severe on alfalfa grown in the 0-4 inch samples (Table 1). The lowest rate at the 4-8 inch depth was the only treatment that did not reduce alfalfa growth. Since the soil had not been disturbed since treatment, the presence of DPX 4189 in the lower depth was a result of leaching by rainfall.

The sugarbeet stand was not reduced when planted 14 months following treatment, but fresh weights were reduced by even the lowest rate of DPX 4189 (Table 2). (Crop Science Department, Oregon State University, Corvallis 97331)

Table 1 Effect of DPX 4189 on unifoliolate-leaf petiole length and foliage fresh weight of alfalfa grown in soil samples from two depths

Rate of DPX 4189 (lbs/A)	Combined length of two petioles (mm) Trial 1	Combined length of two petioles (mm) Trial 2	Foliage fresh wt (g) Trial 1	Foliage fresh wt (g) Trial 2
Sampling depth 0-4 inch				
0.031	13.4	20.4	.072	.074
0.062	4.8	5.0	.060	.062
0.125	4.6	5.6	.056	.054
0.25	5.0	3.0	.064	.078
0.5	1.6	2.8	.054	.050
0	21.2	20.8	.104	.132
Sampling depth 4-8 inch				
0.031	20.4	21.6	.122	.134
0.062	17.8	16.4	.102	.096
0.125	16.0	15.8	.084	.088
0.25	13.6	18.4	.084	.092
0.5	7.4	10.2	.054	.082
0	20.6	18.6	.112	.096
$LSD_{.05}$	4.7	5.1	.019	.026
$LSD_{.01}$	6.3	6.9	.025	.034

Table 2 Effect of DPX 4189 on stand and fresh weight of sugarbeets planted 14 mos after treatment

Rate of DPX 4189 (lbs/A)	Plants/ft of row	Fresh wt/ft of row (g)
0.031	4.6	19.7
0.062	4.6	2.8
0.125	5.5	1.6
0.25	5.1	0.8
0.5	3.8	0.6
0	4.8	38.7
$LSD_{.05}$	ns	6.7
$LSD_{.01}$	ns	9.4

Asulam for yellow foxtail control in alfalfa. Vandepeute, J. Yellow foxtail (*Setaria glauca* L.) is a major weed problem in alfalfa in many areas of the central valley of California. This is a progress report on the use of asulam as a control method. Asulam is a systemic herbicide which may be absorbed by leaves or roots from which it is translocated to other parts of the plant. But foliar uptake is the more effective of the two pathways. The mode of action of asulam is primarily by inhibiting the process of cell division in the growing points of the plant. Accumulation of asulam has been demonstrated in grass meristems, the buds of herbaceous perennials, and the rhizome tips and buds of perennial grasses. The signs of herbicidal action are yellowing of new leaves, stunting and finally death of the plant. Tolerant species such as sugarcane and alfalfa show limited asulam uptake and minimal translocation.

Asulam has been tested in California on alfalfa for several years. The selectivity on alfalfa and activity on foxtail has been confirmed. The objective of current testing was to continue to learn more about timing and to optimize rate of application. The sites chosen for testing in the past including this last year have been areas where alfalfa has been cut for a few years and the stand has been thinned to just a few individual plants due to yellow foxtail competition. Yellow foxtail exists in solid stands established mainly in excessively wet portions of the field. In the 1980 season, yellow foxtail germinated late due to a cool spring. This has tended to reduce their germination period and synchronize the population in the test plots. A more uniform and rapid development occurred due to high temperatures subsequent to test initiation. Applications were made using a small plot backpack type sprayer calibrated to deliver 50 gallons of spray solution per acre from a six foot boom. The plot size was 6 ft. by 36 ft. The table presents results from testing this past season. The herbicide was applied on young foxtail plants with 4 to 6 leaves after irrigation and a mid-season cutting of alfalfa. Applications on the three different dates were made on plots adjacent to each other in the same field. No phytotoxicity to the alfalfa occurred.

Asulam for yellow foxtail control in established alfalfa
Data recorded were obtained on August 5, 1980

Treatment	Rate lb ai/A	% Foxtail Control		
		Applied 6-26	Applied 7-3	Applied 7-11
Control*	0.0	0	0	0
Asulam	0.25	10	10	10
Asulam	0.5	30	60	50
Asulam	1.0	70	99	99
Asulam	2.0	80	99	99

*Weed densities averaged 38 plants per sq. ft.

In former testing programs, earlier applications just after the beginning of germination killed all emerged foxtail but did not provide season-long control at the rates tested. Mid-to-late-season applications on the other hand have resulted in control of all foxtail grass. Asulam is somewhat slow to kill and some seedheads can be present in the hay in a cutting following a late application. Optimum conditions for penetration of asulam include high relative humidity and high temperature. High humidity from heavy dews may reduce efficacy by directly removing spray deposit from the plant. (Rhone-Poulenc Chemical Company, P.O. Box 5416, Fresno, CA 93755)

Wheat and barley tolerance to postplant pendimethalin treatment. Carlson, H. L., J. E. Hill, S. Kite and D. Nielson. The invasion of hard to kill grass weeds, such as canarygrass, into California grain fields has fostered interest in evaluating the selectivity of preemergence dinitroanaline herbicides placed above the level of germinating grain. The tolerance of several wheat and barley varieties to preemergence surface (PES) applications of pendimethalin was determined in field experiments conducted in Kings County.

Separate wheat and barley tests were established side by side in a commercial wheat field on December 2, 1979. Eight wheat and eight barley varieties were planted 2.5 cm deep into dry Tulare clay loam soil. Wheat and barley were sown at a rate of 112 kg/ha and 100 kg/ha, respectively. Following planting, pendimethalin treatments of 0.0, 0.8, 1.7 and 3.4 kg/ha were applied to the soil surface of replicate 1.2 by 5.5 m plots of each variety. The herbicide treatments were applied with a backpack CO_2 pressure sprayer. Four replicate plots were established for each herbicide rate-variety combination. Plots were arranged in a randomized complete block design. Herbicide incorporation was facilitated by 0.5 cm and 0.2 cm of rainfall on December 22 and 31, respectively, and approximately 5 cm of water by rapid flood irrigation on January 3, 1980. Fertilization and subsequent cultural practices were consistent with locally accepted management practices.

Data collected from these experiments included plant height at heading, grain test weight and grain yield. Overall trial averages for both wheat and barley show a slight but statistically significant linear trend ($P \leq 10\%$) toward reduced plant height and test weight with increasing herbicide rate (Table 1). However, differences observed in plant height and test weight within individual varieties were not significant. The pendimethalin treatments did not affect overall yields (averaged across varieties) of either wheat or barley (Table 1). However, the reduced yield of NAPB Oslo at the high herbicide rate is noteworthy. Statistical analysis indicated a significant interaction between variety and herbicide treatment and the difference in yield between the NAPB Oslo treated with the high herbicide rate and the other NAPB Oslo plots exceeded the 5% LSD for comparing yields within a variety (Table 2). (Uni. of Calif. Coop. Ext., Davis and Hanford.)

Table 1 Average effect of postplant (preemergence) pendimethalin treatment on the yield, plant height and test weight of spring wheat and barley[1]

Herbicide	Rate (kg/ha)	Yield (kg/ha)	Plant height (cm)	Test weight (kg/hl)
<u>Wheat</u>				
Control	0.0	7456	96	79.0
Pendimethalin	0.85	7534	99	79.0
Pendimethalin	1.7	7345	95	78.7
Pendimethalin	3.4	7198	93	78.3
LSD (.05)		ns	2.6	ns
<u>Barley</u>				
Control	0.0	5262	114	61.4
Pendimethalin	0.85	5270	113	61.2
Pendimethalin	1.7	4694	112	60.8
Pendimethalin	3.4	5431	110	60.6
LSD (.05)		289	3.1	0.62

[1]Averaged over the eight wheat and eight barley varieties listed in Table 2.

Table 2 Yield of several wheat and barley varieties treated with post-plant (preemergence) applications of pendimethalin

Variety	Herbicide rate (kg/ha) 0.0	0.85	1.7	3.4	Mean
Wheat					
INIA	7124	7217	7245	6778	7091
Anza	6995	7846	7423	6865	7282
Yecora Rojo	7813	7720	7107	7975	7654
Shasta	6932	6543	6762	6555	6698
Germain's W444	7024	7221	6897	7228	7092
NK Pro Brand 611	7989	8046	7473	8017	7881
NK 775 1817	8586	8671	8556	8459	8568
NAPB Oslo	7186	7008	7297	6153	6911
LSD (.05)	--------------595--------------				298
Barley					
Briggs	4543	4375	4770	5068	4689
UC 566	5386	5269	5086	5110	5213
CM 72	5439	4771	4379	5210	4950
Kombyne	4664	5515	5817	6428	5606
Prato	4912	5415	4587	5860	5194
Gus	5161	5346	4496	4421	4856
NK Sunbar Brand 400	6273	5786	5830	5777	5917
NK 4259	5716	5682	4881	5577	5464
LSD (.05)	--------------1076--------------				538

Influence of delaying incorporation of thiocarbamate herbicides on their field performance. Evans, J. O. and R. W. Gunnell. The results of a one-year study concerning the importance of incorporation interval following field applications of selected thiocarbamate herbicides revealed that little or no differences in percent weed control were attributable to the length of time separating application and soil mixing. Furthermore, meaningful herbicidal differences were not observed on either moist or dry seedbed surfaces when incorporation was done immediately, 8 hours, 24 hours, or 36 hours after application. Understandably, the poorest weed control for all species present in this test was recorded for the lowest dosage rates of the herbicides, particularly cycloate. Neither soil surface moisture nor time of incorporation appeared to influence weed control in our studies.

The seedbed representing a dry soil surface was worked vigorously one day prior to herbicide treatment and insured a dry soil surface. The moist seedbed was worked in conjunction with herbicide spraying and presented a uniformly moist surface during spraying. Redroot pigweed and green foxtail seeds were planted to provide a uniform population of weeds for the test. Incorporation was accomplished with a triple K harrow followed by a spike-toothed harrow. (Utah Agricultural Experiment Station, Logan, Utah 84322)

Influence of delayed incorporation on
redroot pigweed and green foxtail control

		Weed Response (percent kill)							
		Redroot pigweed[1]				Green foxtail[2]			
		Hours Between Application and Incorporation							
Treatment	Rate lb/A	0	8	24	36	0	8	24	36
		Moist Soil Surface							
EPTC	3	88	85	90	85	99	89	95	98
EPTC	6	95	93	93	90	100	100	98	100
vernolate	3	91	93	93	94	99	99	99	99
vernolate	6	98	95	98	93	100	100	100	99
cycloate	3	93	88	88	75	97	95	100	93
cycloate	6	92	88	93	84	97	98	93	98
untreated	-	0	0	0	0	0	0	0	0
		Dry Soil Surface							
EPTC	3	90	92	88	87	100	98	95	99
EPTC	6	95	94	99	95	98	98	100	100
vernolate	3	98	92	97	93	97	98	100	100
vernolate	6	98	94	93	95	100	99	98	99
cycloate	3	89	79	88	84	90	88	94	98
cycloate	6	95	92	91	91	96	96	96	94
untreated	-	0	0	0	0	0	0	0	0

[1]Average redroot pigweed density in the trial was 3 plants/square foot.
[2]Average green foxtail density was 2 plants/square foot.

Evaluation of C.D.A. (controlled droplet application) for use in annual and perennial California crops. Kempen, H. M. and Joe Graf. Studies with two rotary atomizer applicators (Micron Herbi and Micro-max) since 1977 have shown widespread usage potential in California for these devices with certain herbicides. Not all herbicide formulations can be used but certain ones, especially glyphosate, work very well indeed.

Grower acceptance of the Micron Herbi has been widespread and continues. Usage is primarily pedestrian, for control of weeds on field ends, ditch and reservoir banks, rice levees, farmsteads, equipment storage yards, spot-treatment and rangeland situations. Usage reduces equipment capital costs, fossil fuel usage and is more cost-effective with glyphosate than with previously used oil-dinoseb solutions.

The Micro-max, a more recent vintage C.D.A. device, appears to be more versatile in orchards, vineyards and open farm land because it permits diluent volumes of 1 to 5 gpa. Lightweight trailer units, pulled by high flotation air cooled engine-powered tricycles or almond nut sweeping units seem most logical with C.D.A. rotary atomizers. Timing of orchard and vineyard spraying in the wet California winter will become possible and thereby reduce herbicide usage. Larger boom units should be useful for preplant herbicide application in open farm land. Regulatory obstacles need to be overcome in California. (Univ. of Calif. Coop. Ext., P. O. Box 2509, Bakersfield, CA 93303.)

PROJECT 6

AQUATIC, DITCHBANK AND NONCROPLAND WEEDS

Nathan Dechoretz, Project Chairman

SUMMARY -

Seven reports on aquatic weeds and one report on noncropland weeds were submitted. One paper summarized the results of a study conducted to determine the extent of the hydrilla infestation in El Centro, Ca. Another report described the competitive interaction between dwarf spikerush and noxious aquatic weeds. A summary of the contributed reports follows and is organized by weed species.

Eurasian watermilfoil - Hydrothol 191 applied in December or April at a rate of 1.0 ppmw provided excellent watermilfoil control during the following summer. In a small farm pond, a new formulation of fenac provided excellent control of this species at 1.0 ppmw. The activity of fenac on watermilfoil was not significantly increased by the addition of komeen. The presence of dwarf spikerush did not cause a reduction in number of Eurasian watermilfoil shoots when the two species were cultured together.

Elodea - Dwarf spikerush reduced the biomass of two species of elodea when cultured together in small containers.

Hydrilla - Results of a field study conducted to evaluate the growth of hydrilla in Sheldon Reservoir showed a maximum tuber density during June and October. In general, combinations of fenac and komeen were not significantly more toxic to hydrilla than either chemical alone. The presence of dwarf spikerush significantly reduced the growth and development of hydrilla.

Pondweeds - The presence of dwarf spikerush reduced the biomass of American, sago and horned pondweed. While spot treatments of the granular form of fenac did not provide satisfactory control of Illinois, sago or American pondweed, the liquid formulation of fenac provided good to excellent control. Komeen at .10 and .25 ppm combined with fenac were more phytotoxic to sago pondweed than either herbicide alone. Extensive field trials were conducted on the draw-down use of fluridone for the control of sago and American pondweed. Fluridone applied to bare soil at 4 and 6 lb/A provided good control through July and August respectively.

Parrotsfeather, Coontail, Chara - The granular and liquid formulations of fenac applied at 1.0 ppmw provided excellent control of parrotsfeather and coontail. Chara was not affected by fenac.

Noncropland weeds - A soil persistence study was initiated in 1975 to compare specific herbicides for weed control longevity. Of the compounds tested, tebuthiuron appeared to be the most persistent.

Biomass and tuber density of Hydrilla in selected sites in the Imperial Irrigation District, El Centro, Ca. L. W. J. Anderson and N. Dechoretz. In an effort to establish "baseline" data on the extent and severity of *Hydrilla verticillata* populations in the Imperial Irrigation District, samples were taken in 1980 to determine biomass and tuber density. Locations included Sheldon Reservoir, a 56-acre, clay-lined regulating pond and several lateral canals. Biomass was determined within 0.25 m^2 grids and tuber density was determined by sieving 6 in dia. X 10 in. core samples. Large variability in both biomass and tuber density was observed. However, based on Sheldon Reservoir, there appeared to be a maximum in tuber density during October and June and a minimum during July. (See tables I and II.) Biomass ranged from 0 to 2014 g. (fresh weight)/m^2 in Sheldon Reservoir.

TABLE I. SUMMARY OF HYDRILLA TUBER DENSITY IN I.I.D. CANALS[1/]

Canal	Date Sampled	Tuber Density (no./m^2)
Wisteria 6A	4/28/80	21.7±13.0 (30)
	8/28/80	0
Thistle 8 Lateral[2/]	4/29/80	191.0±97 (Stat. 1-3)
		0 (Stat. 4-7)
	8/12/80	27.1 (Stat. 1-3)
		0 (Stat. 4-7)
Thistle Main	4/29/80	0 (18)
	4/28/80	24.7
Westside Main	6/11/80	22.6±6.7 (64)
(Trifolium Extension)	7/11/80	37.3±8.6 (64)
Trifolium 14	5/1/80	423.0±121 (15)
	9/3/80	181.4 (15)
Trifolium 16	4/30/80	25.9±10.7 (15)
	8/29/80	107.6 (15)

1/ Values are means ± S.E. for 15.2 cm. core samples. Numbers in parentheses are total numbers of cores taken.

2/ Stations 4-7 are located within a dredged-out section.

TABLE II. SUMMARY OF BIOMASS AND TUBER DENSITY IN SHELDON RESERVOIR [1/]

Date Sampled	Tubers/m^2	Fr. Wt. (g) (0.25 m^2)	Dry Wt. (g) (0.25 m^2)	% Dry Wt.	Length (cm)
5/12/80	33.9±15	161±45	13.7±3	8.5	28.3±4
6/10/80	65.5±21	238±91	30.0±10	12.6	-
7/28/80	12.4±6	300±157	48.4±28	16.0	21.9±2
9/8/80	33.3±15	485.2±77	46.7±28	9.6	48.1±9
10/7/80	59.2±17	507.1±153	48.6±20	9.6	51.8±14

1/ Values for tubers and biomass are means ± S.E. for 45 samples at each sample time. Lengths were determined from 20 rooted plants in 18 samples.

Control of submersed aquatic weeds in irrigation canals with fluridone. Dechoretz, N. and R. T. Pine. One liquid and two pelleted formulations of fluridone were applied to dewatered irrigation canals to determine whether fluridone when applied to the soil as a preemergence treatment would control sago and American pondweed during the following irrigation season. Treatments were made in November, January, and March at 2, 4 and 6 lb/A. The condition of the canal bottom at the time of treatment ranged from bare soil to a dense cover of annual weeds or old aquatic plant debris remaining from the previous irrigation season. Monthly observations were conducted during the irrigation season to evaluate the effects of the herbicide treatments.

Fluridone applied to bare soil at 4 and 6 lb/A provided good control of submersed weed through July and August respectively. Compared to untreated sections of the canal immediately adjacent to the plots and based on visual estimate, approximately 80% of the treated areas were void of any weed growth. However, by September and October submersed weeds in these plots had infested more than 50% of the treated area.

Significant control was not obtained in any of the plots treated at 2 lb/A or in plots treated at 4 and 6 lb/A which had plants or debris covering the plot at the time of treatment. (U.S. Department of Agriculture, SEA-AR, Botany Department, University of California, Davis, CA 95616).

Response of hydrilla, sago pondweed, and Eurasian watermilfoil to various combinations of Komeen and Fenac. Dechoretz, N. and R. T. Pine. Greenhouse tests were conducted to determine whether or not combinations of Komeen and Fenac were more phytotoxic to aquatic plants than either herbicide alone. Assays for phytotoxicity were made by placing one pot of each of the rooted plants into 20 l of water containing the herbicide(s). Each treatment was replicated three times. The degree of phytoxicity was based on visual observations of the plant response made at weekly intervals for four weeks.

Results are shown in the following table. Fenac did not increase the phytotoxicity of Komeen to Hydrilla. Except for Fenac at 0.50 ppm plus Komeen at 0.10 ppm, combining the two chemicals did not significantly increase herbicidal activity on milfoil.

The activity of Fenac plus Komeen on sago pondweed was surprising. Additions of Fenac to 0.10 and 0.25 ppm Komeen caused significant increase in activity. In contrast, the addition of Fenac to Komeen at 0.50 and 1.0 ppm did not appear to increase the activity of Komeen on sago pondweed. (U.S. Department of Agriculture, SEA/AR, Botany Department, University of California, Davis CA 95616).

EFFECT OF VARIOUS COMBINATIONS OF KOMEEN AND FENAC ON HYDRILLA, SAGO PONDWEED AND EURASIAN WATERMILFOIL

		Weed Response 1/		
Treatment	Rate	Hydrilla	Sago	Milfoil
Control	0	0.4(0.2) 2/	0	0.8(0.4)
Fenac	.10	0.7(0.3)	0.7(0.4)	2.8(1.5)
	.25	3.0(2.0)	1.8(1.4)	6.5(3.7)
	.50	2.4(1.3)	5.5(2.3)	8.8(6.1)
Komeen	.10 3/	3.0(2.1)	1.3(1.3)	5.3(2.5)
	.25	6.0(4.4)	4.7(4.3)	4.7(3.6)
	.50	9.0(7.7)	5.0(3.8)	5.3(4.9)
	1.0	10.0(8.2)	5.3(3.7)	6.0(5.3)
Fenac+	.10+.10	2.3(1.7)	6.3(3.9)	5.0(2.6)
	.25+.10	2.7(2.1)	5.3(2.9)	6.3(3.8)
	.50+.10	5.6(4.6)	9.7(5.6)	10.0(7.8)
	.10+.25	5.0(4.3)	6.0(4.2)	5.3(3.7)
	.25+.25	5.0(3.7)	9.0(5.5)	6.7(4.3)
	.50+.25	7.3(5.2)	8.7(5.9)	7.7(5.9)
	.10+.50	10.0(7.2)	5.7(3.9)	6.7(4.4)
	.25+.50	10.0(7.3)	5.0(3.4)	7.3(4.7)
	.50+.50	10.0(8.2)	5.3(3.7)	5.7(4.0)
	.10+1.0	10.0(7.7)	5.3(3.9)	6.7(4.8)
	.25+1.0	7.7(5.8)	4.3(3.0)	5.3(3.8)
	.50+1.0	10.0(7.4)	4.3(2.9)	4.0(3.3)

1/ Response of weeds based on 0 to 10 scale: 0=no response, 10=dead.

2/ Figure within parentheses are averages of 4 weekly ratings. Figures not in parentheses are final ratings made at the end of 4 weeks.

3/ Komeen concentration expressed as ppm copper ion.

Control of Eurasian watermilfoil in cement-lined reservoirs with Hydrothol 191. Dechoretz, N. and R. T. Pine. A number of reservoirs located on the Davis campus of the University of California have become infested with Eurasian watermilfoil. The continuous deposition of silt has contributed to the establishment and spread of milfoil in these cement-lined reservoirs. During the summer months when water from these reservoirs is critically needed for various agricultural experiments, fragments of milfoil find their way into the irrigation system and plug up pumps and sprinkler equipment.

Since water temperatures in these reservoirs are quite moderate (13° C) during December, milfoil plants do not undergo the typical senescence process. During April and May, new plants develop from buds located on the plants remaining in the reservoir from the previous growing season. Since herbicide applications to the reservoirs during the summer were not permitted, a study was conducted to determine whether or not applications of Hydrothol during December and April will provide control of watermilfoil during the following summer.

A 5 ac-ft reservoir was treated in December while two 10 ac-ft reservoirs were treated in April. A fourth reservoir containing approximately 5 ac-ft of water was left untreated. All three reservoirs were treated with the granular form of Hydrothol at a rate of 1.0 ppmw. The herbicide was applied with a manually-operated spreader. Approximately 60% of the reservoirs were infested with milfoil. Almost all the plants ranged from 6 to 12 ft in length at the time of treatment.

Watermilfoil in the reservoir treated in December slumped to the bottom and decayed over a three-month period. The reservoir was inspected at monthly intervals. New plants were not discovered until mid-July and based on visual estimates, less than 10% of the reservoir was infested in October, ten months after the treatment.

Since water temperatures in the reservoirs treated in April were slightly higher than in December (16° C), watermilfoil was controlled in these reservoirs over a one-month period. Regrowth during the following summer did not occur in one reservoir. This was probably due to a dense phytoplankton bloom which inhibited the transmittance of light through the water column. The algae bloom developed in June and persisted through the summer. Regrowth in the other 10 ac-ft reservoir was quite sparse and by September less than 10% of the reservoir was infested with milfoil. Plants were less than 12 inches in length. During the same period, the infestation of watermilfoil in the untreated reservoir had increased from 60 to 80% of the surface area. (U.S. Department of Agriculture, SEA/AR, Botany Department, University of California, Davis, CA 95616).

Control of aquatic weeds in ponds with different formulations of fenac. Dechoretz, N. and R. T. Pine. Field studies were conducted to evaluate the effects of two new formulations of fenac on a number of different aquatic weeds. Total water body treatments were made in the Ocean View and Falkenberg Ponds while only half the Gary pond was treated. Fenac was applied to 2 and 3 small plots in Lake Vera and Wizzenbanger, respectively. Each plot was approximately .33 ac. Water depth in the treated areas ranged from 4 to 8.5 ft. All treatments were made at a rate of 1.0 ppmw.

The granular formulation (10G) was applied with a hand-operated fertilizer spreader while the liquid formulations (1.5 and 3.0 lb/gal) were either sprayed over the water surface or introduced into the water behind a motor-driven boat. Results are shown in the accompanying table. Fenac, in granular or liquid form, provided excellent control when applied as a total water body treatment. Since we could not detect any difference between the response of the plants in the untreated and treated area of Gary Pond, we assumed the herbicide became dispersed throughout the pond quite rapidly. This probably contributed to the somewhat longer period of time required to obtain good control of Illinois and sago pondweed. Based on results obtained in Wizzenbanger and Lake Vera, it appears that the 3.0 lb/gal liquid formulation was more effective than the 1.5 lb/gal or the 10G formulation. However, further studies are needed.

As expected, Chara was not affected by the fenac treatments and visual observations of the treated area indicated no adverse effects on fish populations. Furthermore, periodic analysis of the treated water showed that any changes in water quality that occurred appeared insignificant. (U.S. Department of Agriculture, SEA/AR, Botany Department, University of California, Davis CA 95616).

CONTROL OF AQUATIC WEEDS IN PONDS TREATED WITH FENAC

Pond Name	Formulation	Weed Species	Percent Control Day after Treatment 7	14	21	28	42
Ocean View	10G	Parrotsfeather	--[a]	50	--	100	100
		Chara					
Wizzenbanger Plot 1	3.0 lb/gal	Illinois pondweed	0	25	50	75	100
		Sago pondweed	0	40	50	80	100
		Chara	0	0	0	0	0
Plot 2	1.5 lb/gal	Illinois pondweed	0	10	25	50	90
		Sago pondweed	0	0	0	0	50
		Chara	0	0	0	0	0
Plot 3	10G	Illinois pondweed	0	0	0	0	50
		Sago pondweed	0	0	0	0	50
		Chara	0	0	0	0	0
Gary[b]	3.0 lb/gal	Illinois pondweed	0	25	50	75	100
		Sago pondweed	0	10	50	50	75
		Coontail	0	50	75	100	100
		Chara	0	0	0	0	0
Lake Vera[c]	10G	American pondweed	--	50	--	50	50
		Sago pondweed	--	50	--	50	50
Falkenberg	3.0 lb/gal	Eurasian watermilfoil	0	25	75	100	100
		Leafy pondweed	25	50	75	100	100

a/ No evaluations made.

b/ No difference between treated half and untreated half of pond.

c/ No difference between the two treated plots.

Persistence of soil-active herbicides for non-crop weed control under two rainfall regimes. McHenry, W.B., L.L. Buschman, W.H. Brooks and N.L. Smith. Vegetation control on non-crop farm and industrial sites often involve annual applications of soil-active herbicides. A soil persistence study was initiated in 1975 to compare specific herbicides for weed control longevity on general annual weeds. Two sites were selected, one at Ukiah, CA (40 in. average precipitation) the other at Yuba City, CA (22 in. average precipitation). Bromacil, diuron, simazine, tebuthiuron, and hexazinone were applied February 24, 1975, at Yuba City at 2,4,8 and 16 lb ai/A. The same herbicides with the exception of bromacil were applied at the same rates on April 11, 1975 at Ukiah. A carbon dioxide pressurized backpack sprayer was employed for the applications. A complete randomized block design with four replications was utilized. Amitrole was included in all treatments at 1 lb ai/A. No subsequent herbicide treatments have been made. Annual weed control evaluations have been made after each winter season. All soil-applied herbicides at the Ukiah site exhibited 100% weed control the first year.

At Yuba City, control ranged from 70% to 100% in 1975. In subsequent years it became apparent that tebuthiuron was clearly the most persistent compound. In 1977 all tebuthiuron rates provided 95% to 100% control at rates of 4 lb. ai/A or higher at Ukiah. Of the remaining compounds, hexazinone yielded 76% control at 16 lb. ai/A All other treatments ranged from 0% to 4% control. At Yuba City in 1975 all rates of tebuthiuron, hexazinone, and bromacil yielded 95% to 100%. At the same site diuron provided 88% control; all remaining treatments ranged from 0% to 25% control.

By 1980, tebuthiuron at Ukiah gave 90% to 93% control at 8 and 16 lb. ai/A. Values for remaining herbicides and rates ranged from 0% to 30%. At Yuba City, tebuthiuron yielded 77% to 100% control at 4, 8, and 16 lb. ai/A; and bromacil yielded 77% at 8 lb. ai/A and 100% at 16 lb. ai/A. Remaining treatments ranged from 0% to 48% control. (University of California Cooperative Extension, Davis, CA 95616).

The competitive effect of dwarf spikerush on various rooted aquatic weeds. Yeo, R. R. and J. R. Thurston. Seven important rooted aquatic weeds were each grown in combination with dwarf spikerush plants and alone in 75 L tubs filled with water and placed under 55 percent shadecloth. The cultures were allowed to grow from May 1979 to October 1980. At the end of the growing period, plant shoot and tuber counts and total dry weights were measured for each aquatic weed. The data are summarized in the accompanying table.

Eurasian watermilfoil and sago pondweed showed no significant differences between plant shoot counts with or without dwarf spikerush. There were significant differences between the dry weights of each kind of aquatic weed grown with dwarf spikerush and the aquatic weed grown without dwarf spikerush in all except Eurasian watermilfoil. Tuber production in sago and American pondweeds and hydrilla correlated well with reduction in aquatic weed biomass when grown with dwarf spikerush. (U.S. Department of Agriculture, SEA-AR, Botany Department, University of California, Davis CA 95616).

SUMMARY OF THE COMPETITIVE EFFECTS OF SEVERAL AQUATIC WEEDS GROWN WITH DWARF SPIKERUSH

Treatment	Average number of shoots[a]	Average dry weight of plants[a] (mg)	Average number of tubers[a]
American pondweed	121	35	156
American pondweed plus dwarf spikerush	38	9	73
Sago pondweed	85	31	740
Sago pondweed plus dwarf spikerush	11	11	286
Hydrilla	33	69	76
Hydrilla plus dwarf spikerush	16	17	36
American elodea	96	45	
American elodea plus dwarf spikerush	18	9	
Nuttall's elodea	102	54	
Nuttall's elodea plus dwarf spikerush	17	7	
Horned pondweed	645	9.7	
Horned pondweed plus dwarf spikerush	34	0.1	
Eurasian watermilfoil	20	50	
Eurasian watermilfoil plus dwarf spikerush	19	40	

[a] Value per 0.21 m^2.

Response of dwarf spikerush to diruon applied at two rates and then leached with different rates of water. Yeo, R. R. and J. R. Thurston. Trays, 8 by 8 cm, containing established dwarf spikerush sod or Yolo clay loam, 3 cm deep, sown with seeds or tubers of dwarf spikerush, were sprayed with diuron at rates of 18 and 36 kg per hectare. Control plants were not treated with diuron. The soil in the trays was leached with water for 72 h. All treatments were then placed in tanks with continuously flowing water. Observations on the condition of the dwarf spikerush plants were made every week for 12 weeks. Rosette counts and plant dry weights were taken after 12 weeks.

Diuron was found injurious to dwarf spikerush plants, but some plants survived in all treatments. No differences were found between the two rates of diuron and no consistent differences were found between the different leaching rates. The culms turned brown by the fourth week in the sod treatments, but regrew by the sixth week. Tubers and seeds began germinating within the first and second week, respectively. The percentage germination was reduced, but the plants were visibly unaffected. The control plants had significantly more rosettes and greater plant dry weight than those in the diuron treatments. (U.S. Department of Agriculture, SEA/AR, Botany Department, University of California, Davis, CA 95616).

PROJECT 7

CHEMICAL AND PHYSIOLOGICAL STUDIES

S. Radosevich - Project Chairman

INDEX:

Author	Crop	Weed	Herbicide(s)
Zimdahl, R.L.	Wheat	None	dicamba, Dowco 290
	sugar beet		dicamba, Dowco 290
	oat		dicamba
	Alfalfa		dicamba, Dowco 290
	Beans		dicamba, Dowco, 290
	Sunflower		Dowco 290
Stovicek, R.F.	None	Canada Thistle	benazolin, dicamba
Lee, G.A.	None	Canada Thistle	benazolin, dicamba
Thill, D.L.	None	Canada Thistle	benazolin, dicamba
McAuliffe, D.	Corn	None	ethofumesate
	Wheat	None	ethofumesate
Appleby, A.P.	Corn	None	ethofumesate
	Wheat		ethofumesate

Four papers were submitted to this project. Field and/or greenhouse bioassays were used to determine the persistence of three herbicides in soil. When dicamba was applied to soil in either Fall or Spring, differences in crop yields were observed according to rate of herbicide applied, season of application, and crop species. Beans were the most sensitive crop to dicamba residues. Generally little or no effect was observed to other crops when low rates were applied. A similar study involving Dowco 290 was performed. No toxic effects of that herbicide to any crop were observed.

Field and greenhouse studies were employed to determine the degree of herbicide activity of ethofumesate under moist and dry soil conditions. Greater activity was always observed when the soil was moist rather than when it was dry. Subsequent analysis by gas-liquid chromatography indicated increased ethofumesate loss under dry soil conditions.

A study was also conducted to determine the effect of dicamba, benazolin, and combinations of these herbicides on the cell anatomy of Canada thistle. Increased foliage symptoms and anomalous cambium activity in roots were observed with the herbicide combinations.

Synergistic effects of benazolin and dicamba on Canada thistle. Stovicek, R. F., G. A. Lee, and D. C. Thill. A study was initiated in May of 1979 to determine the effect of various rates of dicamba, benazolin, and dicamba + benazolin tank mixes on the cellular anatomy of Canada thistle. Histological studies were conducted on the roots. Canada thistle plants were propagated from roots removed from the field, cut into 6.5 cm lengths, and planted in 20 cm plastic pots. All sections were allowed to grow for 47 days under natural light in the greenhouse. Herbicides were applied at the end of this period. Plants were divided into 22 groups of three plants each and each group was sprayed with one of 21 different rates of the herbicides. Herbicides were applied in water with a knapsack sprayer. The plants were evaluated for foliar phytotoxic symptoms after 21 days. Root sections of 0.5 cm were taken at a distance far enough from the root tips to avoid problems caused by increased lateral root initiation associated with dicamba. The sections were then placed into a killing and fixing solution of FAA (formaldehyde, glacial acetic acid, and ethyl alcohol), passed through a dehydration series, and embedded in paraplast. Embedded sections were cut with a microtome and placed on slides with Haupt's adhesive. Differential staining was accomplished using safranin and fast green.

Phytotoxic ratings indicated a synergistic effect between dicamba and benazolin in Canada thistle. Dicamba treated plants developed epinastic bending, chlorosis, necrosis, stem swelling, and stem lesions at the highest rates. The lowest rates of dicamba developed a minor degree of epinastic bending and some necrosis of the apical meristems. Benazolin treatments produced the same symptoms as dicamba but required higher rates. Low rates of benazolin appeared to inhibit leaf expansion but vertical growth of the plants equalled that of the checks. Tank mixes of dicamba applied at 0.37 and 0.56 kg/ha with benazolin resulted in phytotoxic effects greater than the expected additive effects of the two taken individually.

Cross sections of the roots showed that the tank mixes do produce synergistic effects, even when foliar observations do not indicate a synergism. The difference may be explained by a lag in foliar symptoms, which may be observed if the length of the experiment is extended. Root sections removed from the plants treated with the tank mixes showed a greater increase in anomalous cambial activity relative to the dicamba treatments. The anomalous cambium is located throughout the parenchymous percyclic tissues that develop during the secondary growth of the Canada thistle roots. The cambium resemble primary vascular cambium by developing in percyclic tissues and producing xylem and phloem, but the resemblance ends there. The anomalous vascular cambium are always found centrifugal the phloem of the primary vascular cambium but occur in radial, tangential, and circular patterns.

The increase in this cambial activity appears to be independent of lateral root growth and adventitious root and shoot initiation. This increased meristematic activity appears to be related to the rate of dicamba, but is also enhanced by the addition of benazolin in tank mixes. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide Rates Applied to Canada Thistle

Benazolin kg/ha	Dicamba + Benazalin kg/ha	Dicamba kg/ha
0.14	0.07 + 0.14	0.07
0.28	0.07 + 0.28	0.14
0.56	0.07 + 0.56	0.25
1.12	0.14 + 0.14	0.56
	0.14 + 0.28	1.12
	0.14 + 0.56	
	0.14 + 1.12	
	0.28 + 0.14	
	0.28 + 0.28	
	0.28 + 1.12	
	0.56 + 0.14	
	0.56 + 0.28	

The influence of soil moisture on ethofumesate activity. McAuliffe, David and Arnold P. Appleby. Ethofumesate is a highly selective herbicide in ryegrass seed fields. It is used in Oregon as a preemergence application in the fall for control of annual grass weeds. Recently, it has been observed that application before the soil is adequately moistened resulted in a dramatic loss in ethofumesate activity.

Field and greenhouse trials were conducted using Jubilee sweet corn and Stephens winter wheat as bioassays for ethofumesate activity. Treatments consisted of various soil moisture levels and herbicide rates. Ethofumesate was applied to soils at different moisture levels and these soil moisture levels were maintained for 2, 3, or 4 days before all treatments were irrigated to equal moistures.

Corn and wheat growth was significantly greater for ethofumesate applications made to dry soils. The length of time the herbicide remained on a dry soil had little effect on herbicide activity in the field trials. Table 1 gives the results of the field study using winter wheat as the bioassay.

Greenhouse trials substantiated the results from the field work. The percent control varied by as much as 63% between soils at 2% moisture compared to those at 36% moisture.

Additional work using gas chromatography showed a decrease in the amount of ethofumesate present in a dry soil over time. The results are presented in Table 2. These data indicate a probable chemical degradation of ethofumesate in a dry soil resulting in the loss in activity. (Crop Science Department, Oregon State University, Corvallis 97331)

Table 1 The growth of winter wheat treated peremergence with ethofumesate, expressed at % of untreated check

Herbicide rate (kg ai/ha)	Soil moisture level	Fresh weight yield, Length of dry period: 48 h	96 h
0.28	Dry[a]	93.2	107.4
	Wet[b]	93.4	102.8
0.56	Dry	78.2	100.5
	Wet	86.8	74.9
0.84	Dry	82.9	84.5
	Wet	56.1	57.2
1.13	Dry	69.4	70.7
	Wet	41.0	27.2
$LSD_{.05}$[c]		19.9	18.3

[a]Soil moisture 2.8% w/w for top 2 cm

[b]Soil moisture 28.0% w/w for top 2 cm

[c]$LSD = R\ t_{.05}\left(\sqrt{\frac{2ems}{5}}\right)$ R = 1.15 for 8 means

Table 2 The disappearance of ethofumesate from dry soil

Days after application	Soil moisture level: 20% w/w µg extracted	20% w/w µg extracted
0	350	379
2	155	386
4	102	343
6	62	384
12	35	398

Table 3 The influence of length of dry period and soil moisture on the activity of ethofumesate incorporated to 2 cm, expressed as fresh weight % of untreated control for respective moisture levels (greenhouse study)

Irrigation-days after spraying	Ethofumesate rate (kg/ha)	Soil moisture level: 2% w/w	12% w/w
		%	%
0	0.2	1.5	10.4
	0.4	0.4	0.5
2	0.2	49.8	2.4
	0.4	16.5	0.3
4	0.2	30.2	1.3
	0.4	6.4	0.5
$LSD_{.05}$[a]		6.7	

[a] $LSD = R\left(t_{.05}\sqrt{\frac{2\ ems}{4}}\right)$ R = 1.18 for 12 means

Dicamba persistence in soil. Zimdahl, R. L. This is a report of a two-year field study of dicamba persistence. Plots were established on August 23, 1978 and May 18, 1979. The soil was a clay loam with a pH of 7.6, 2.2% organic matter, 42% sand, 28% silt, 30% clay, a field capacity of 21.8%, and a cation exchange capacity of 19.3 meq/100 g. Spray volume was 15 gpa applied with a Massey-Ferguson garden tractor with sprayer attachment, 8003 nozzle tips, and 40 psi. The August, 1978 application included rates of 0, .5, 1, 2, and 4 lb ai/A and the May, 1979 application included rates of 0, 0.125, 0.25, 0.5 and 1 lb ai/A. In August, the air temperature was 22 C and soil was 25 C at the surface and 18 C at 5 cm. In May, air temperature was 26.7 C, soil was 32.2 C at the surface, and 25.5 C at 5 cm. Each plot was 3 by 12 m and the entire plot area was 36.5 by 76 m at each time. Crop variety, planting date, and harvest date for each year are shown in Table 1. All of the crops were planted in the normal manner except alfalfa, which was planted with a fertilizer spreader and harrowed in. Alfalfa has been harvested from the 1979 study but no harvest data are available from the planting made in 1980. It is important to note that the interval between spraying and planting was always longer after spring application of lower rates. The fall treatments were applied on August 23, 1978 and wheat was planted one month later. Wheat was planted 4.5 months after the spring application. Spring crops were planted about 8.5 months after fall application and 11.5 to 12 months after spring application.

Yield data are shown for each crop and application time (Table 2). Specific comments on each crop follow.

Wheat. There was no effect of .5 or 1 pound of dicamba on wheat yield after fall application. Two lb ai/A decreased yield and 4 lb ai/A gave an additional decrease. The same relationship was observed for wheat height. The average heights for 0, .5, and 1 lb ai/A were all over 40 inches whereas 2 lb ai/A averaged 32 inches and 4 lb ai/A averaged 26 inches. These plots were reseeded to wheat in September, 1979 and although wheat yield was low (range 39 to 41.9 bu/A, complete data not included) because of lack of a fallow period, there was no effect of dicamba residue. There was no observable effect on growth or yield from any of the spring applied rates.

Sugarbeets. A combination of injury from postemergence herbicide application and soil crusting resulted in a poor sugarbeet stand in the fall experiment. There was no consistent relationship between dicamba rate and stand. Sugarbeets were harvested even though we suspected the data would not be valuable and there were no differences between the yields (Table 2) but we do not think this is representative of the real effect of dicamba on sugarbeets. There was a significant decrease in percent sucrose caused by 4 lb ai/A but this could have been related to poor stand rather than the herbicide. Our conclusion is that nothing can be learned from the sugarbeet portion of the fall applied study. There were no differences in the yield of beets or sugar after spring application (Table 2). There was a definite trend toward lower yield with increasing rate and one assumes an increase to 1.25 lb ai/A would significantly decrease yield but with our experimental design this remains an assumption.

Oats. There were no significant differences in yield of oats although there was a trend toward lower yield when dicamba was applied at 4 lb ai/A in the fall. The same trend was observed in oat height. Because of the lower rate of application and longer time between spraying and planting no effects were expected and none occurred after spring application (Table 2).

Alfalfa. Four lb ai/A applied in the fall of 1978 was the only rate which decreased yield of alfalfa harvested in June, 1980.

Table 1
Crop Information
Dicamba Persistence Study - 1978-80

Crop	Cultivar	Fall Application August 23, 1978 Planting	Harvest	Spring Application May 18, 1979 Planting	Harvest
Winter wheat	Baca	9/25/78	7/30/79	9/30/79	7/22/80
Sugarbeets	GW Mono-Hy	5/ 1/79	10/18/79	4/22/80	10/21/80
Corn	Northrup-King				
	PX20	5/17/79	10/ 4/79		
	PX15			5/14/80	10/7-9/80
Oats	Cayuse	5/16/79	8/22/79	5/19/80	9/ 3/80
Alfalfa	Ranger	5/17/79	6/20/80		
	NK-Thor			5/19/80	None
Beans	Pinto Idaho Certified III	5/17/79	9/ 5/79	5/15/80	9/10/80

Table 2
Crop Yield
Dicamba Persistence Study

Dicamba rate lb ai/A	Wheat (bu/A)	Sugarbeets (T/A)	Oats (bu/A)	Corn (T/A)	Beans (cwt/A)	Alfalfa (T/A dw)
	Crop Yield - Fall Application					
0	69.4a[1]	6.4	52.5	2.6	16.9a	1.42a
0.5	74.0a	6.3	50.5	3.3	16.1ab	1.51a
1	67.9a	9.4	49.2	3.1	13.8c	1.43a
2	42.0b	8.3	53.5	2.9	7.8d	1.40ab
4	18.5c	2.4	37.7	3.0	1.7e	0.56b
	Crop Yield - Spring Application					
0	79.7	15.7	24.2	4.1	23.8b	Will
0.125	85.5	13.0	24.0	4.6	24.7b	be
0.25	91.2	11.1	27.5	4.1	53.6a	harvested
0.5	82.3	11.8	27.4	3.8	53.9a	in
1.0	81.1	11.7	30.8	3.2	40.5ab	1981

[1]Yield values in a column for one crop and application time are not different at P = 0.05 if followed by the same letter according to Tukey's LSD test. Yields in columns with no letters are not different.

Corn. Inspection of the data suggested no differences and statistical analysis verified the supposition after fall application. Although there was a trend toward lower yield with increasing rate after spring application, yields were not different when compared to the check (Table 2).

Beans. The effect of fall applied dicamba was readily apparent in beans. The only rate that did not affect yield was 1.5 lb ai/A. All other rates reduced yield and as rate increased yields significantly decreased in every case. There was an easily observable effect of dicamba on bean morphology with the plants showing definite growth regulator or hormone herbicide effects as rate increased. Dicamba also affected bean stand but the effect was slightly different than that on yield. One-half pound did not reduce the stand below the control and all other rates did. Spring applied dicamba did not reduce yield and, in fact, increased it at 0.25 and 0.5 lb ai/A (Table 2). The highest rate did not increase nor did it depress yield below the check. Weed populations were not noticeably different between rates and this cannot account for the observed effect. One can hypothesize stimulatory effects of low doses of growth regulator herbicides but we have no evidence to firmly support or deny the hypothesis.

If dicamba is applied at 1 lb ai/A or less in late summer or early fall, winter wheat, planted the same fall and oats or corn planted the following spring can be grown successfully. Spring application at rates up to 1.0 lb ai/A did not affect fall planted wheat yield or corn and oats planted the following spring. The evidence does not prove that fall applied rates above 1.0 lb ai/A are damaging to oats or corn but they are to wheat. Fall applications above .5 lb ai/A decreased bean yield and .5 lb is questionable. Bean yield was increased by 0.25 and 0.5 lb ai/A applied in the spring but there was no added effect from 1.0 lb. No conclusions regarding dicamba's effect on sugarbeets could be drawn from the fall study but there was no effect from the lower rates applied in the spring. Alfalfa, planted in the spring after fall application, was tolerant of all but the highest rate (4 lb ai/A).

The evidence suggests that dicamba can be used in the fall or spring to control appropriate weeds and some crops, particularly monocotyledons, can be successfully grown the next year. The success of dicotyledonous crops is more questionable but the possibility is not eliminated.

Dowco-290 persistence in soil. Zimdahl, R. L. This is a report of a two-year field study of Dowco-290 persistence. Plots were established on May 18, 1979 (spring application) and August 27, 1979 (fall application). The soil was a clay loam with a pH of 7.5, 2.4% organic matter, 40% sand, 31% silt, 29% clay; a field capacity of 21.8%, and a cation exchange capacity of 19.3 meq/100 g. Spray volume was 15 gpa applied with a Massey-Ferguson garden tractor with sprayer attachment, 8003 nozzle tips, and 40 psi. The rates for fall and spring applications were 0, 0.25, 0.50, and 1.0 lb ai/A. In May, air temperature was 17.8 C and soil 15.6 C at 5 cm. In August, air temperature was 15 C and soil was 15.6 C at 5 cm. Each plot was 3 by 12 m and the entire plot area was 36.5 by 76 m. Crop variety, planting date, and harvest date for each crop are shown in Table 1. All crops were planted with normal farm equipment. No additional herbicides were used but five hand hoeings were performed.

Yield data are shown for each crop and application time (Table 2). Specific comments on each crop follow. The most interesting observation is that there were no significant effects on any crop from fall application of Dowco-290. There was only one effect of spring application and it is confusing in itself and doubly confusing because the effect was from a residue which had been present longer than the fall applications which showed no effect. The data show (Table 2) that 0.25 and 0.50 lb ai/A increased sugarbeet yield and 1.0 lb ai/A did not decrease yield below the control. We have no explanation for these results except the often hypothesized but presently unsubstantiated stimulatory effect of very low doses. This hypothesis needs additional verification before a positive explanation can be offered.

It is also interesting to note that yields were lower for wheat and beans grown after fall application. A possible explanation is that weeds grew on the area during the summer of 1979 prior to herbicide application in the fall and soil moisture could have been depleted.

The data show no problems with the five crops when they are grown the season after spring or fall application of 0.25, 0.5, or 1.0 lb ai of Dowco-290/A.

Table 1
Crop Information
Dowco-290 Persistence Study - 1979-80

Crop	Cultivar	Spring (May 79) and Fall (Aug. 79) Application Planting	1980 Harvest
Winter wheat	Baca	9/30/79	7/22
Sugarbeets	GW Mono-Hy	4/22/80	10/21
Corn	Northrup-King PX-15	5/14/80	10/7 to 9
Sunflowers	Northrup-King NK-212	5/14/80	9/2 to 9
Beans	Pinto - Idaho Certified III	5/15/80	9/10

Table 2
Crop Yield
Dowco-290 Persistence Study

Dowco 290 rate lb ai/A	Wheat (bu/A)	Sugarbeets (T/A)	Sunflowers (lb/A)	Ear Corn (T/A)	Beans (cwt/A)
	Crop Yield - Fall Application				
0	65.0	17.5	2334	3.3	27.4
0.25	67.4	20.2	2199	4.3	28.8
0.50	59.9	19.5	2217	3.7	29.2
1.0	63.7	18.3	2093	4.0	34.5
	Crop Yield - Spring Application				
0	81.5	18.7ab[1]	2546	3.4	53.3
0.25	79.1	20.6a	2411	3.5	52.3
0.50	83.7	21.6a	2004	3.5	57.5
1.0	84.6	16.7b	2503	3.7	53.8

[1]Values followed by the same letter are not different at P = 0.05 according to Tukey's LSD test. Yield values not followed by letters are not different.

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HERBACEOUS WEED INDEX

(alphabetically by scientific name)

HERBACEOUS WEED INDEX

(alphabetically by common name)

WOODY PLANT INDEX

(other than ornamentals)

HERBICIDE INDEX

(by common name or code designation)

This table was compiled from approved nomenclature adopted by the Weed Science Society of America (Weed Science 26(6):1978) and WSSA Herbicide Handbook (4th ed.). "Page" refers to the page where a report about the herbicide begins; actual mention may be on a following page. A herbicide name occupying two or more lines and separated by an equal (=) sign is written as one word when written on one line.

Common Name or Designation	Chemical Name	Page
bentazon	3-isopropyl-1H 2,1,3-benzothi= adiazin-4-(3H)-one 2,2,-dioxide	98, 120, 205, 237
bifenox	methyl 5-(2,4-dichlorophenoxy)-2-nitrobenzoate	164, 237
bromacil	5-bromo-3-sec-butyl-6-methyluracil	54,315
bromoxynil	3,5-dibromo-4-hydroxybenzonitrile	9, 80, 88, 98, 162, 178, 182, 186, 194, 205, 266, 281, 286, 287, 295
buthidazole	3,[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-4-hydroxyl-1-methyl-2-imidazolidinone	17, 266, 268
butylate	S-ethyl diisobutylthiocarbamate	98, 199, 202, 264
CDEC	2-chloroallyl diethyldithio-carbamate	202
CGA	not available	235
chloramben	3-amino-2,5-dichlorobenzoic acid	72, 73, 74, 76, 93, 115, 195, 197, 237, 253, 254, 255, 257, 259, 260, 262, 264
chlorflurenol	methyl 2-chloro-9-hydroxyfluorene-O-carboxylate	4
chloroxuron	3-[p-(p-chlorophenoxy)phenyl]-1, 1 dimethylurea	115
chlorpropham	isopropyl m-chlorocarbanilate	72, 73, 74, 76, 115, 179, 237
cyanazine	2-[[4-chloro-6-(ethylamino)-s-triazin-2-yl]amino]-2-methyl= propionitrile	98, 199, 201, 205, 276, 278
cycloate	S-ethyl N-ethylthiocyclohexane= carbamate	98, 117, 228, 251, 255, 257, 264, 279, 304
2,4-D	(2,4-dichlorophenoxy)acetic acid	9,14,15,16,17,18,20,22, 30,32,33,34,35,36,38, 39,41,56,58,60,62,64, 123,141,182,186,188, 190,201,205,277,281, 286,287,295

ABBREVIATIONS USED IN THIS REPORT

A.	acre(s)
a.i.	active ingredient
a.e.	acid equivalent
aehg	acid equivalent/hundred gallons
bu	bushel(s)
C.	degrees Centigrade
cm	centimeter(s)
cwt.	one hundred pounds
F.	degrees Fahrenheit
fps.	feet per second
gal.	gallon(s)
gpa.	gallons per acre
gpm.	gallons per minute
ha	hectare
hr	hour(s)
in	inch(es)
kg	kilogram(s)
l.	liter(s)
lb	pound(s)
m.	meter(s)
min.	minute(s)
ml	milliliter(s)
mph.	miles per hour
oz	ounce(s)
pes.	preemergence surface
ppb.	parts per billion
ppi.	preplant incorporated
ppm.	parts per million
psi.	pounds per square inch
pt	pint
sq	square
sq ft.	square feet
rd	rod
wt	weight
WA	wetting agent