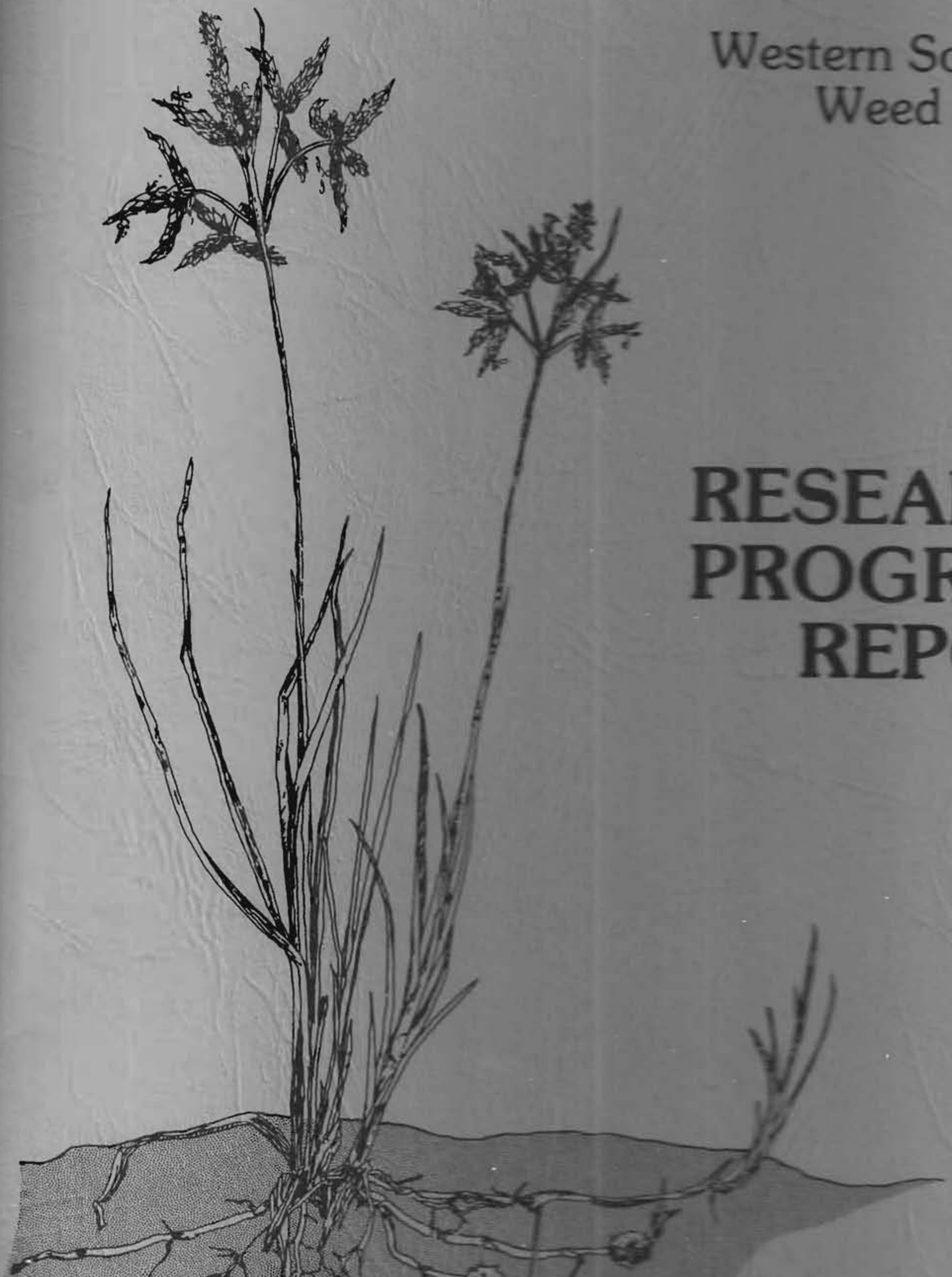
Western Society of
Weed Science



1980 RESEARCH PROGRESS REPORT

Salt Lake City, Utah
March 18, 19, 20, 1980

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of
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ISSN 009-8142

FOREWORD

The Western Society of Weed Science 1980 Research Progress Report is a compilation of brief reports of recent investigations by weed scientists in the western U.S. The primary function of this volume is to facilitate interchange of information within the scientific community; it is not meant to serve as a means of presenting conclusions, endorsements or recommendations to the general public. In this context, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION. This represents an effort by the WSWS to facilitate effective research, improve communication among scientists having common interests, minimize duplication of effort, and to promote a sharing of the benefits of scientific effort.

This 1980 Western Society of Weed Science Research Progress Report, the largest ever, is the second such WSWS report 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). Although editorial rules are prescribed in the call for papers, and although some degree of peer review is expected prior to submitting reports, authors do not always follow such protocol. In the interest of information exchange, reports were accepted for printing except for profound deviations.

The compilation of reports and indices was the responsibility of the chairman of the research section and the seven subject matter project chairmen, each of whom assembled, indexed and summarized reports submitted to his particular project. Final responsibility rests with 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. Appreciation is extended, finally, to the clerical staff of the University of Idaho Aberdeen Research & Extension Center, who, at the end, produced organization out of chaos.

Robert H. Callihan
Chairman, Research Section
Western Society of Weed Science
1980

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PROJECT 1

PERENNIAL HERBACEOUS WEEDS

G. F. Hittle - Project Chairman

SUMMARY (RHC) -

Thirty reports were submitted. Reports included quackgrass, hoary cress, Russian knapweed, Canada thistle, field bindweed, bermudagrass, field horsetail, leafy spurge, orange hawkweed, common tansy, seaside arrowgrass, rush skeletonweed, and Rocky Mountain iris. One paper dealt with herbicide drift simulation.

Bermudagrass - Responses of bermudagrass to 2 lb/A glyphosate applied at 3 vs 4 months intervals or in volumes of water diluent ranging from 8 to 25 GPA did not differ significantly.

Canada Thistle (3 reports) - Picloram at 1 or 2 lb/A, with or without 2,4-D, provided 95% or better thistle control 3 years after treatment, whereas control of thistle in plots treated with dicamba, Vel 4027, Dowco 290, triclopyr, fosamine, glyphosate 2,4-D and combinations of 2,4-D + Dowco 290 or dicamba ranged between 7 and 77%. Soil fumigation with Telone II, while reducing thistle stands by as much as 64%, did not influence the percent stand reduction by herbicides applied to regrowth the second year. March application of DPX 4189 provided better early season control than did 3,6-dichloropicolinic acid.

Field Bindweed (4 reports) - Picloram combined with 2,4-D provided acceptable control of bindweed, while glyphosate or combinations of glyphosate with 2,4-D or dicamba did not. Young bindweed plants from Washington and from England were not found to differ in cold tolerance.

Bindweed control for spring barley with fall applications of glyphosate was improved by adding X-77 or by combining 2,4-D or dicamba, but lack of control of annual weeds may have reduced potential yield benefits.

Field Horsetail (4 papers) - EPTC provided better control of horsetail than did other thiocarbamates. Fumigation with 1,3-dichloropropene at depths of 6" or 15" provided considerable control of horsetail.

Hoary Cress (1 paper) - June 1 application of 0.25 lb ai/A resulted in late season control of hoary cress in alfalfa, although stand thinning of alfalfa occurred.

Iris (1 paper) - July applications of paraquat plus X-77, paraquat plus glyphosate, and glyphosate provided Iris control.

Leafy Spurge (5 papers) - Picloram treatments provided consistently better control of leafy spurge than other treatments, a year after treatment. There were indications that treatments using a conventional sprayer delivering 40 GPA were better than those applied by a Herbi sprayer. Glyphosate treatments after frost resulted in better control than those applied before frost. One month after treatment, the percent spurge control by herbicides

was found to be closely related to the percent live roots in the upper 6 to 8 inches of soil, and to the resistance of surviving shoots to pull force.

Orange Hawkweed (1 paper) - Hawkweed-infested pasture produced no useable forage, whereas plots treated in early June with picloram, picloram + 2,4-D or dicamba + 2,4-D produced 2000 lb/A forage in early July.

Quackgrass (2 papers) - Addition of dicamba or 2,4-D to glyphosate treatments did not increase quackgrass control over that obtained with glyphosate alone. Late June or late September treatments were more effective than May treatments to 4" quackgrass.

Rush Skeletonweed (2 papers) - Picloram, Dowco 290, dicamba + 2,4-D and Dowco 290 + 2,4-D provided good early control of skeletonweed, but only picloram treatments provided enough residual effectiveness for control after 18 months.

Russian Knapweed (2 papers) - July application of commercial glyphosate and dicamba applied to knapweed in early bloom resulted in acceptable control into the following year. May treatment of vegetative plants was relatively ineffective. Two applications of 5 kg ae/ha three weeks apart was an outstanding treatment.

Seaside Arrowgrass (1 paper) - 2,4-D at 4 or 6 lb/A provided good arrowgrass control, but 2 lb/A dicamba or picloram at 0.5 or 1 lb/A were ineffective.

Common Tansy (2 papers) - Picloram and picloram + 2,4-D treatments were effective 30 months after treatment, but 2,4-D, bentazon, dichlorprop, glyphosate, dicamba or dicamba plus 2,4-D were not satisfactorily effective by that time.

Herbicide Drift Simulation (1 paper) - Seedling plants of alfalfa, sugar beet, spinach and lettuce were sensitive to dicamba dosages of 0.006 lb/A and above; alfalfa and sugar beet were sensitive at doses as low as 0.0006 lb/A. All species were sensitive to 0.06 lb/A 2,4-D.

Response of common bermudagrass to glyphosate in three volumes of water. Hamilton, K.C. and C. Doty. The response of bermudagrass to applications of glyphosate in three volumes of water at two treatment intervals was studied in two tests at Tucson, Arizona. In the Spring of 1977 and 1978, 192 plants of common bermudagrass spaced 10 by 15 feet were established by planting rhizome segments from a single 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.

Plants covered an estimated 100 and 70 sq ft when treatments started April, 1978 and May, 1979. Glyphosate at 2 lb/A was applied at 3 and 4-month intervals in 25, 16, and 8 gpa of water. Each plot contained four plants and treatments were replicated four times. The area covered by living topgrowth was estimated for each plant before each treatment.

All glyphosate treatments killed topgrowth of bermudagrass. Two applications of glyphosate at 3 and 4-month intervals resulted in a 98 to 99% reduction in bermudagrass topgrowth at end of one growing season (see table). No treatment significantly reduced the number of plants with topgrowth. There was no difference in the response of bermudagrass to glyphosate applied in 25, 16, and 8 gpa of water. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

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

Treatment		Plants with topgrowth		Plant Size sq ft	
Months between	Volume gpa	10/9/78	10/26/79	10/9/78	10/26/79
3	25	16	13	1.7	0.3
3	16	16	14	1.6	0.8
3	8	14	11	1.1	0.9
4	25	14	16	0.2	0.6
4	16	9	14	0.2	0.6
4	8	15	15	0.4	0.6

Longevity of Canada thistle control. Alley, H. P. and N. E. Humburg. Invariably chemical control evaluation studies concerned with the control and reduction in stand of perennial weeds are continued for only a year or so and then abandoned. Longevity of control studies could provide information on actual kill of both top and root growth, competition from associated grass species, and the soil persistence of the herbicide. Most perennial weed evaluations report control, which is in most cases, a recording of only vegetative top growth and not the vegetative underground parts of the plant which can give rise to new shoots and reinfest the area.

The Canada thistle plots which were established September 2 and 10, 1976 have been maintained and vegetative top growth control recorded for three successive years. Canada thistle was mature with active seed dispersal at time of treatment. The soil was a sandy loam (68.0% sand, 25.6% silt, 6.4% clay, 8.4% organic matter with a 7.5 pH). All treatments, except the granular material, were applied in 40 gpa water to square rod plots with three replications arranged in a randomized complete block design.

Visual evaluations were recorded on May 23, 1977, July 26, 1977, July 19, 1978 and July 26, 1979, approximately 8, 10, 22 and 34 months following application. After approximately three years, four treatments maintained 90% or better Canada thistle stand reduction. These were: picloram/2,4-D at 1.0 + 2.0 and 2.0 + 4.0 lb ai/A; and picloram 10% pellet at 1.0 and 2.0 lb ai/A. Three treatments--Dowco 290 at 3.0 lb ai/A, picloram/2,4-D at 0.5 + 1.0 lb ai/A, and fosamine at 8.0 lb ai/A resulted in 70% or greater control after three years. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 975).

Herbicides, Canada thistle control, one, two and three years following treatment

Herbicide[1]	Rate lb ai/A	Percent Control May 23, 1977	July 26, 1977	July 19, 1978	July 26, 1979
dicamba	4.0	100	93	25	24
dicamba	6.0	87	99	5	17
Vel 4027	4.0	70	45	12	33
Vel 4027	6.0	72	80	15	47
dicamba/2,4-D	2.0 + 6.0	97	63	80	13
dicamba/2,4-D	4.0 + 12.0	90	73	38	27
Dowco 290	1.5	100	100	93	63
Dowco 290	3.0	100	100	100	77
triclopyr	1.5	92	35	3	7
triclopyr	3.0	56	47	8	37
fosamine	2.0	40	0	0	0
fosamine	4.0	58	0	50	37
fosamine	6.0	82	30	50	17
fosamine	8.0	83	56	58	70
2,4-D A	3.0	72	78	90	65
2,4-D A	6.0	63	25	70	53
2,4-D A	12.0	61	42	45	63
2,4-D A	20.0	66	40	8	33
2,4-D A	40.0	94	83	100	63
picloram/2,4-D	0.5 + 1.0	100	100	100	77
picloram/2,4-D	1.0 + 2.0	90	100	100	95
picloram/2,4-D	2.0 + 4.0	100	100	98	98
picloram 10K	1.0	89	97	100	97
picloram 10K	2.0	97	100	100	100
glyphosate	1.5	96	77	72	47
glyphosate	2.25	95	77	60	7
glyphosate	3.0	84	58	50	24
Dowco 290/2,4-D	0.25 + 1.0	100	75	48	17
Dowco 290/2,4-D	0.5 + 2.0	96	87	38	53

[1]Herbicides applied September 2 and 10, 1976.

Evaluation of various rates and application of 1,3-D and retreatment of regrowth for Canada thistle control. Alley, H. P., G. L. Costel, N. E. Humburg and R. E. Vore. Previous research utilizing various soil fumigants and methods of soil injection and/or placement have indicated a potential for Canada thistle control. The data reported herein is a follow-up on previous research with fumigants to more clearly identify rates of application and application techniques. In addition to control reported for the fumigant treatments, data are included for postemergence applications of dicamba/2,4-D, picloram/2,4-D, picloram, dicamba, 2,4-D LVE and glyphosate applied postemergence to Canada thistle regrowth on the original fumigant treated plots.

The study area was uniformly and heavily infested with Canada thistle which had produced a spring wheat crop in 1976 and was disced twice during 1977 and prior to application of 1,3-D. The soil was a clay loam (25.6% sand, 38.0% silt, 26.4% clay, 2.7% organic matter with a 7.1 pH). Plots were 15 ft by 320 ft, replicated four times in a randomized complete block.

Three methods of injection and/or placement of the 1,3-D were utilized; the Noble blade, injection shank, and plow down. 1,3-D emulsifiable concentrate plus emulsifier mixed with water was used where 1,3-D was applied with the Noble blade. 1,3-D was applied, without dilution, with the injection shank and plow down by gravity flow. The fumigant was placed approximately 10 inches deep with the injection shank, 8 inches deep with the Noble blade and 10 to 12 inches deep with the plow. A cultipacker was used to compact the soil immediately following application.

Canada thistle shoots in 24-4 sq ft quadrats were counted in each replication to determine the percentage Canada thistle control. These data are reported in the 1979 WSWS Research Progress Report, pp 5-6.

The emerging Canada thistle shoots, most from root segments, were treated with the herbicides listed in Table 2 of the attached tables. The postemergence treatments were applied May 23, 1978 across all fumigant treatments when the Canada thistle was in a 2 to 6 inch rosette.

Canada thistle shoot counts made May 19, 1979, one year following postemergence applications, show that picloram at 0.5 lb ai/A and picloram/2,4-D at 0.5 + 1.0 lb ai/A were the most effective treatments, irregardless of the fumigant, method of application or rate of application. Dicamba applied at 2.0 lb ai/A and dicamba/2,4-D at 1.0 + 3.0 lb ai/A afforded 45 and 64% shoot reduction, respectively. Glyphosate at 1.0 and 2.0 lb ai/A was not effective. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 976).

Table 1. Percentage reduction in Canada thistle resulting from soil application of 1,3-D one and two years following application.

Application technique	Rate gpa	Percent stand reduction	
		1978	1979
Noble blade (EC)	5	41	14
Noble blade (EC)	10	68	25
Noble blade (EC)	20	84	53
Shank	20	73	25
Shank	25	78	11
Shank	30	97	23
Plow down	20	75	19
Plow down	25	83	64
Plow down	30	83	52

Table 2. Canada thistle stand reduction resulting from post herbicide treatments applied over original 1,3-D plots.

Herbicide	Rate lb ai/A	Percent stand reduction
dicamba	2.0	45
dicamba/2,4-D	1.0 + 3.0	64
2,4-D LVE	2.0	23
picloram	0.5	97
picloram/2,4-D	0.5 + 1.0	99
glyphosate	1.0	0
glyphosate	2.0	0

Canada thistle control with DPX 4189 and 3,6-dichloropicolinic acid. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. A trial was established at Corvallis, Oregon to compare the effectiveness of DPX 4189 and 3,6-dichloropicolinic acid on emerging Canada thistle. The trial was a randomized complete block with two replications and 2.5 by 8 m plots. The herbicides were applied on March 13, 1979, when the Canada thistle had up to four leaves.

Evaluations on June 3 indicated that DPX 4189 provided 90% control and 3,6-dichloropicolinic acid produced 45% control. Later applications of 3,6-dichloropicolinic acid have produced excellent control of Canada thistle. The poor control in this trial was probably due to the early stage of Canada thistle development. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

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

Plots were established August 2, 1978 to field bindweed which was in full flower. 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, 28.8% silt, 5.2% clay, 1.8% organic matter with a 7.8 pH) was saturated. All treatments were applied with a 6-nozzle knapsack in 40 gpa water carrier. Plots were arranged in a complete randomized block, 18 ft by 15 ft, with three replications.

Visual control evaluations July 26, 1979 indicated that the combinations of picloram/2,4-D at 0.5 + 1.0 and 1.0 + 2.0 lb ai/A were the only treatments resulting in effective bindweed control. Glyphosate at 3.0 lb ai/A gave only a 27% reduction in field bindweed stand. The combination of glyphosate/dicamba or glyphosate/2,4-D at half rate glyphosate, afforded more control than the higher rate of glyphosate alone. The additional control resulting from the glyphosate/dicamba and glyphosate/2,4-D combinations is probably attributed to dicamba or 2,4-D in the mixture rather than any synergistic activity. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 983).

Herbicide combination and percent top growth reduction of field bindweed

Treatment	Rate lb ai/A	Percent control
glyphosate	2.0	27
glyphosate/dicamba	1.5 + 0.5	40
glyphosate/dicamba	2.25 + 0.5	67
glyphosate/2,4-D A	1.5 + 0.5	10
glyphosate/2,4-D A	1.5 + 1.0	53
picloram/2,4-D	0.5 + 1.0	98
picloram/2,4-D	1.0 + 2.0	100

Cold tolerance of field bindweed plants from two seed sources. Swan, D.G. Casual observations have shown that field bindweed (*Convolvulus arvensis* L.) will tolerate light frosts in the spring or fall and in the fall will continue its growth plus producing food for root reserves.

This study was conducted to compare the cold tolerance of plants grown from two seed sources.

Materials and Methods

On January 10, 1979, field bindweed seed produced in Oxfordshire, England in 1976 and Whitman County, Washington in 1978 was treated with concentrated sulfuric acid for 20 minutes. After treatment, the seed was washed in tap water for 30 minutes before planting in pots. The temperature in the greenhouse during growth of the seedlings ranged from 6 to 16 C.

From March 22 to March 30, when the plants averaged 25 leaves, two single plant replications of each treatment were exposed to the cold treatments. This was accomplished by placing the plants in a cardboard box in a chest-type freezer. The box buffered temperature variations. Thermistors were taped near the plants to monitor the temperature. Each treatment started with the freezer temperature at 16 C. When the freezer was turned on, the temperature reached -6 C in 1 3/4 hours and 10 C in 6 hours. For one additional replication, the freezer was turned colder and the temperature reached -10 C in 2 hours.

The freezer was shut off when the desired temperature was reached and the chest allowed to warm before the plants were removed.

Results

The results are shown in the table. It appears that field bindweed plants grown from seed produced in Oxfordshire is similar in cold tolerance to those plants produced from Whitman County seed. Both seed sources produced plants that were quite frost tolerant.

The newest growth was most susceptible to frost injury. For those plants with an injury rating of 9, only portions of the basal leaves remained green. All plants except one recovered from the injury. Those with ratings of 2 to 7 continued their topgrowth. Those with a 9 or 10 rating regenerated from underground plant parts. (Weed Biology, Weed Research Organization, Begbroke Hill, Yarnton, Oxford, England OX5 1PF.)

Injury ratings from exposing greenhouse-grown field bindweed plants to freezing temperatures

Minimum temperature (C)	Hours to attain minimum temperature	Injury rating[a] Oxfordshire	Whitman County
- 6	1.75	0	0
- 8	2.25	4	2
- 9	2.50	6	7
-10	6.00	9	9
-10	2.00	10	9
Average		6	5

[a] Rating scale: 0 = no frost effect; 10 = complete topgrowth kill.

Field bindweed control with 2,4-D, dicamba and glyphosate. Whitesides, Ralph E. Two field trials were established near The Dalles, Oregon, to evaluate field bindweed control using combinations of 2,4-D, dicamba and glyphosate. Both trials were randomized complete block designs with four replications. Herbicides were applied in June and July, 1979, when bindweed plants had vines which had 50 to 85% seed pod production.

Evaluations were made on August 28, 1979, and show that 2,4-D (3 lb ae/A) provided 88% and 54% control at the two locations. Dicamba when applied at 1 lb ae/A was evaluated at 86% and 46% control and glyphosate (1.5 lb ae/A) was rated 55% and 26%. A tank mixture of 2,4-D (1.0 lb ae/A), dicamba (0.5 lb ae/A) and glyphosate (1.0 lb ae/A) resulted in 95% and 73% control at the two locations. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Field bindweed control and barley yields following herbicide applications. Wattenbarger, D. W. and W. S. Belles. A study was initiated on fallow ground on September 19, 1978 to evaluate the effect of combinations of glyphosate with 2,4-D (amine), dicamba, or a surfactant (X-77) on the control of field bindweed and subsequent barley yields. Herbicides were applied with a knapsack sprayer calibrated to deliver 40 gpa total volume of water carrier. Treatments were replicated three times in 9 by 30 foot plots arranged in a randomized complete block design. Field bindweed was in the late bloom stage with 2 to 4 plants per square foot. Light frosts occurred on September 15 and the morning of application. Plots were seeded to Kimberly barley on May 15, 1979. Visual evaluations of field bindweed control were made on July 2. Barley yields were taken from a 4 by 24 foot area of each plot harvested on September 20 with a plot combine.

Field bindweed control at the 4.0 lb ai/A rate of glyphosate was increased from 89 to 99% by the addition of the surfactant at 0.5% by volume. Control was notably increased by the surfactant with 2.0 lb ai/A glyphosate. Combinations of glyphosate at 2.0 lb ai/A + 2,4-D (amine) or dicamba at .5 and 1.0 lb ai/A increased control compared to the 2.0 lb ai/A rate of glyphosate alone. Dicamba at 6.0 lb ai/A gave results comparable to the two rates of glyphosate alone. 2,4-D (amine) at 2.0 lb ai/A resulted in 53% control of field bindweed.

Barley yields were generally increased by all treatments. Annual broadleaf weeds, mainly redroot pigweed and common lambsquarters, may have reduced potential gains with some treatments.

Effect of herbicides on field bindweed control and barley yields

Treatment[1]	Rate	Field bindweed Control[2]	Barley yield[3]
	(lb ai/A)	(%)	(lb/A)
Control	0	0	1918
Glyphosate	2.0	86	3318
Glyphosate	4.0	89	2481
Glyphosate + surfactant	2.0 + 0.5% v/v	88	2283
Glyphosate + surfactant	4.0 + 0.5% v/v	99	2715
2,4-D (amine)	2.0	53	2070
Glyphosate + 2,4-D (amine)	2.0 + 0.5	94	2905
Glyphosate + 2,4-D (amine)	2.0 + 1.0	92	1835
Dicamba	6.0	88	2427
Glyphosate + dicamba	2.0 + 0.5	98	2540
Glyphosate + dicamba	2.0 + 0.5	98	2614

[1]Treatments were applied September 19, 1978.

[2]Visual evaluations were made July 2, 1979.

[3]Plots were harvested September 20, 1979.

Response of field horsetail to several thiocarbamate herbicides. Coupland, D. and D. V. Peabody. A field trial was established near Mount Vernon, WA to determine the relative effectiveness of a group of thiocarbamate herbicides against field horsetail, Equisetum arvense L. The selected site was one that had previously remained fallow for four years and had a natural, uniform stand of horsetail. Soil type was a silt loam with 3.4% organic matter and a pH of 6.5. Each plot measured 15 by 30 ft. and treatments were applied on June 8, 1979. The weather at the time of application was warm (air temperature 65 F) and sunny; wind speed was measured at 0 to 2 mph.

Herbicides were applied using a tractor mounted sprayer equipped with nine 8003, Low Pressure TeeJet nozzles operating at 15 psi. The tractor was driven at 2 mph producing a delivery rate of 45 gpa. Immediately after each application, the herbicides were incorporated to a depth of 6 inches using a rotovator. Check plots were similarly rotovated.

Approximately 4 months after application the plots were assessed. Quadrats were used to sample the horsetail shoots, eight quadrats being thrown at random per plot. Shoots were cut off just above soil level and their dry weights measured. The percent reduction in dry matter yield was determined by comparison to the check.

EPTC showed the highest activity against horsetail, with virtually no differences between the 6 and 12 lb/a rates. Butylate was the next most effective followed by vernolate, cycloate, pebulate then molinate. At the low rates, there were no differences between molinate, cycloate and pebulate.

The efficacy of these herbicides may depend to a large extent on their volatilities. Apart from pebulate, the relative activities of these compounds correlated well with their vapor pressures.

Based on these data, the use of EPTC for horsetail control merits further study. (Northwestern Washington Research and Extension Unit, Mount Vernon, WA 98273)

Comparison of thiocarbamate herbicides for control of field horsetail

Herbicide	Rate (lb ai/A)	% reduction dry matter yield	Vapor pressure at 25 C [1/] (mm x 10^{-3})
EPTC	6	96.5	34
	12	97.3	
Molinate	6	20.4	5.6
	12	16.1	
Cycloate	6	24.9	6.2
	12	46.1	
Butylate	6	78.0	13
	12	96.3	
Pebulate	6	15.7	35
	12	36.1	
Vernolate	6	43.0	10.4
	12	74.5	

1/ Figures obtained from the Herbicide Handbook of the Weed Science Society of America, Fourth Edition, 1979.

Field horsetail control using a soil fumigant containing 1,3-dichloropropene. Coupland, D. and D. V. Peabody. Field horsetail, *Equisetum arvense* L., is a perennial weed that has proven difficult to erradicate with soil - or foliage - applied herbicides. In and around the Mount Vernon area it occurs in many types of situations including high value cash crops. A means of effectively controlling this weed is therefore desirable. This report summarizes a field experiment conducted near Mount Vernon, WA using the soil fumigant "DD" (manufactured by the Shell Chemical Company). The main active ingredients in this product are 1,3-dichloropropene, 1,2-dichloropropane, 3,3-dichloropropene and 2,3-dichloropropene. The site chosen was one that had a natural and very dense stand of horsetail (100% ground cover before application). A week before treatment the site was rotovated to a depth of 6 inches to destroy and bury the horsetail shoot material. The product was applied at 50 gpa at two depths. For the shallow treatment, the chemical was injected into the soil using 6 inch shanks set 1 ft. apart. For the deep treatment, the chemical was injected 15 inches into the soil using chisel shanks set 2 ft. apart. After application, a rotary harrow and light roller were used to help cover up the treatment areas and partially compact the ground in order to prevent excessive chemical losses due to vaporization. Plot size was 25 by 50 ft. and treatments were applied on July 24, 1979. The experiment was laid out in a randomized complete block design with four replications per treatment. Check plots were treated in exactly the same way as the "DD" plots except that no chemical was applied. At the time of application the weather was warm (57 to 64 F), humid (94 to 80%) with a slight breeze. Soil temperature at 4 inches was 63 F.

Plots were harvested approximately 3 months after application. Shoot samples were taken using 1 ft. square quadrats thrown at random, ten times per plot. Shoots were cut just above soil level and dry weights subsequently measured. Soil cores were taken to obtain samples of rhizome material. A 16 by 2 inch (diameter) soil corer was used, five cores being taken at random per plot. The rhizome material was carefully washed, blotted dry, weighed then fragmented into single-node pieces. Tubers were also isolated, then all pieces counted and planted in sand contained in flats. These were kept in the glasshouse for approximately 3 weeks after which all sprouted nodes and tubers were counted. Percent regrowth was calculated as: (number regrown ÷ number planted) x 100. The percent reduction in dry matter yield, rhizome fresh weight and rhizome viability were determined by comparison to the relevant check treatment.

Both shallow and deep placement of the soil fumigant gave essentially the same results. Shoot dry weight was considerably reduced, in fact the treated areas were completely weed-free for almost two months after application. There was slightly less rhizome material in the cores from the deep treatment plots and the viability of this material was also slightly less than that from the shallow treatment plots.

Although this is a relatively high cost treatment the effects on weed control were impressive and the additional benefits gained by using a soil fumigant (soil pathogen and other weed control) may make this cost worthwhile. (Northwestern Washington Research and Extension Unit, Mount Vernon, WA 98273)

Treatment	Shallow	Deep
% reduction in shoot dry wt.	97.0	93.0
% reduction in rhizome fresh wt.	58.2	69.6
% reduction in rhizome viability	50.6	69.6

Hoary cress control in alfalfa with DPX 4189. Whitesides, Ralph E. and Patrick K. Boren. A field trial was established near John Day, Oregon, to evaluate DPX 4189 for control of hoary cress and to examine alfalfa tolerance. The trial was a randomized complete block design with three replications and 6 by 20 ft plots. Treatment was made June 1, 1979, to alfalfa in the bud that was 16 inches tall and to hoary cress in full bloom and 8 to 14 inches tall. DPX 4189 was applied at 0.25 lb ai/A.

Visual evaluations were conducted September 6, 1979, when regrowth of the hoary cress had started in the check plots. Skeletons of hoary cress plants were found in plots treated with DPX 4189, but there was no regrowth at the time of evaluation. Control of hoary cress was reported as 100%. Alfalfa plants in the treated plots were growing normally when evaluated. The alfalfa stand was very thin in the plot area and further alfalfa tolerance information should be collected. (Crop Science Department, Oregon State University, Corvallia, OR 97331).

Rocky Mountain iris control in pasture. Whitesides, Ralph E. A field trial was established 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. Herbicide treatments were made July 19, 1979.

Evaluations on October 10, 1979, indicated that paraquat + 0.25% X-77 (1.0 lb ai/A) and glyphosate (2.0 lb ae/A) gave 89% iris control. Lower rates of paraquat or glyphosate were not as effective. A tank mixture of 0.5 lb ai/A paraquat plus 0.5 lb ae/A glyphosate gave 80% control. (Crop Science Department, Oregon State University, Corvallis, OR 97331).

Combinations of glyphosate/dicamba and glyphosate/2,4-D and resulting leafy spurge control. Alley, H. P., R. E. Vore and N. E. Humburg. Combinations of glyphosate/dicamba and glyphosate/2,4-D were compared to individual herbicide treatments, dicamba, glyphosate and picloram for their effectiveness in reducing the stand of leafy spurge.

Plots were established June 18, 1978 to a dense stand of leafy spurge which was fully matured and in the seed ejection stage. Soil was a loam (43.2% sand, 36.2% silt, 26.6% clay, 2.7% organic matter with a 6.9 pH). All herbicides were applied with a hand operated knapsack spray unit in 40 gpa water carrier.

Visual control evaluations on June 20, 1979, one year following applications, indicate that none of the combinations were highly effective. The combinations gave 60 to 70% reduction in the stand of leafy spurge at the rates applied. Picloram at 1.0 and 2.0 lb ai/A resulted in 90 and 100% stand reduction, respectively. Glyphosate at 2.0 lb ai/A gave only a 10% reduction in leafy spurge stand, dicamba at 4.0 lb ai/A, 40% reduction. One-half and three-fourths rate of glyphosate plus 0.5 lb ai/A dicamba, and one-half rate of glyphosate plus 0.5 and 1.0 lb ai/A 2,4-DA was more effective than glyphosate or dicamba applied individually at higher rates of application. There may be evidence of synergism, even though the percentage leafy spurge controlled is not adequate. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 977).

Herbicide, combinations and percent leafy spurge control

Treatment	Rate lb ai/A	Percent Control	Observations
glyphosate	3.0	10	60 to 70% grass reduction
glyphosate/dicamba	1.5 + 0.5	70	60 to 70% grass reduction
glyphosate/dicamba	2.25 + 0.5	60	40 to 50% grass reduction
glyphosate/2,4-D A	1.5 + 0.5	60	
glyphosate/2,4-D A	1.5 + 1.0	60	
dicamba	2.0	10	
dicamba	4.0	30	
picloram	1.0	90	Grass prostrate
picloram	3.0	100	Grass prostrate

Leafy spurge control resulting from various treatments. Alley, H. P., R. E. Vore and N. E. Humburg. Leafy spurge control evaluation plots were established June 21, 1978 on a dense stand of leafy spurge infesting a rangeland site. The leafy spurge was in full bloom at time of treatment. Plots were 9 ft by 25 ft arranged in a complete randomized block with three replications. All liquid treatments were applied with a 6-nozzle knapsack unit in 40 gpa water carrier. Soil was classified as a sandy loam (68.4% sand, 25.6% silt, 6.0% clay, 5.2% organic matter with a pH of 7.3).

Visual evaluations made May 5, 1979, approximately one year following application, showed treatments of picloram and/or combinations of picloram/2,4-D or picloram/dicamba gave 100% control. Dicamba at rates of 6.0 to 8.0 lb ai/A was required for 90% or greater control. The combination of dicamba/2,4-D at 2.0 + 6.0 lb ai/A was the weakest of the treatments evaluated.

Plots treated with 2.0 and 3.0 lb ai/A of picloram was clipped and grass production compared to the untreated check plots. The untreated areas, in competition with the leafy spurge, yielded 400 lb/A air-dry grass as compared to 1200 lb/A and 500 lb/A respectively, from the plots treated with 2.0 and 3.0 lb ai/A of picloram. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 981).

Leafy spurge control and grass production

Herbicide	Rate lb ai/A	Percent control	Grass production lb/A air-dry
picloram	2.0	100	1200
picloram	3.0	100	500
picloram/2,4-D	2.0 + 4.0	100	
picloram/2,4-D	3.0 + 6.0	100	
picloram/dicamba	0.5 + 2.0	100	
picloarm/dicamba	1.0 + 2.0	100	
triclopyr	4.0	92	
triclopyr/2,4-D LV	4.0 + 2.0	90	
dicamba	4.0	83	
dicamba	6.0	92	
dicamba	8.0	98	
dicamba/2,4-D	2.0 + 6.0	28	
picloram (2% beads)	2.0	100	
picloram (2% beads)	3.0	100	
picloram (2% pellet)	2.0	100	
picloram (2% pellet)	3.0	100	
Check	---	0	400

Herbicide combinations and comparison of Herbi vs 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 of the experiment was to compare 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 control evaluations made June 20, 1979 indicate that only the picloram treatments were effective in reducing the shoot growth of leafy spurge. Of interest is the percentage control obtained with the Herbi as compared to application of picloram in approximately 10 times as much carrier with the knapsack unit. Picloram, applied with the Herbi, at 1.0 and 2.0 lb ai/A resulted in 90 and 93% control, respectively, as compared to 98 and 100% control with equivalent rates of picloram applied with the knapsack. Even though the air movement was less than 2 to 3 mph, the fine micron droplets, produced from the Herbi, moved off the target area as evidenced by wilting of the leafy spurge two weeks following application. This wilting outside the plot area was not evident where the picloram treatment was applied in 40 gpa water with the knapsack unit. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 982).

Percent leafy spurge control--Herbi vs conventional application methods

Treatment	Rate lb ai/A	Percent Control	Observations
glyphosate	2.0	10	80 to 90% grass reduction
glyphosate/dicamba	1.5 + 0.5	0	Spurge height suppressed
glyphosate/dicamba	2.25 + 0.5	0	" " "
glyphosate/2,4-DA	1.5 + 0.5	0	" " "
glyphosate/2,4-DA	1.5 + 1.0	0	" " "
buthidazole	3.0	0	80 to 90% grass reduction
buthidazole	6.0	10	100% " "
buthidazole/dicamba	3.0 + 2.0	0	80 to 90% " "
buthidazole/dicamba	6.0 + 2.0	0	80 to 90% " "
dicamba	2.0	10	
dicamba	4.0	20	
dicamba	6.0	40	
dicamba/2,4-D	1.0 + 2.0	40	
dicamba/2,4-D	2.0 + 4.0	40	
picloram (Herbi)	1.0	90	No reduction in stand of grass; however, prostrate.
picloram (Herbi)	2.0	93	
picloram (conventional)	1.0	98	
picloram (conventional)	2.0	100	

Effects of herbicides on forage and leafy spurge control the following year after application. Belles, W. S. and D. W. Wattenbarger. Several herbicide treatments were applied to leafy spurge in the early bud stage on May 25, 1978. Treatments with glyphosate alone and in combination with 2,4-D and dicamba were also applied at maturity and after frost. Plot size was 9 by 30 feet with three replications arranged in a randomized complete block design. Granular picloram was applied by hand in a mixture with soil. Liquid materials were applied in water at 40 gpa with a knapsack sprayer. Population of leafy spurge was 2 plants/sq. ft. Visual evaluations were made on May 29, 1979 of control of leafy spurge and resulting grass cover.

Picloram (K salt) at 1.0 and 2.0 lb ai/A, dicamba at 4.0 and 6.0 lb ai/A and picloram (K salt) + 2,4-D (amine) at .5 + 1.0 and 1.0 + 2.0 lb ai/A resulted in 90% or better control of leafy spurge. Glyphosate applied at the pre-bloom stage and after frost at 2.0 and 4.0 lb ai/A resulted in better than 80% control. Combinations of 2,4-D (amine) and dicamba with 2.0 lb ai/A of glyphosate resulted in greater than 80% control when applied in the pre-bloom stage only. Dicamba plus 2,4-D (amine) at 1.0 + 3.0 and 2.0 + 6.0 lb ai/A also resulted in better than 80% control of leafy spurge.

Glyphosate alone and in combination with 2,4-D (amine) or dicamba did not produce above 30% control when applied to mature spurge in early August. Early bud applications of 2,4-D at 2.0 and 4.0 lb ai/A and dichlorprop at 2.0 and 4.0 lb ai/A resulted in less than 80% control of leafy spurge.

Grass cover was variable and ranged from a low of less than 40% with glyphosate and glyphosate + 2,4-D (amine) and dicamba treatments applied in late May, to a high of 100% with glyphosate at 4.0 lb ai/A applied in early August. Grasses were growing vigorously at the time of the May application and were damaged by glyphosate at this date. The summer was dry in 1979 and grasses were dormant at the time of the August application, resulting in little damage. Picloram (5% pellets) and picloram (K salt) at 2.0 lb ai/A reduced grass cover about 20% below the check as did dicamba at 6.0 lb ai/A.

Effect of herbicides on forage and leafy spurge control, the following year after application

Treatment	Rate	Observations (5-29-79) Control	Grass cover
	(lb ai/A)	——(%)——	——(%)——
Early bud			
Control	0	0	77
Picloram 2% pellets (M4301)	1.0	91	70
Picloram 2% pellets (M4301)	2.0	97	70
Picloram 2% beads	1.0	97	83
Picloram 2% beads	2.0	98	80
Picloram 5% pellets (M3864)	1.0	93	70
Picloram 5% pellets (M3864)	2.0	94	57
Picloram K salt	1.0	96	80
Picloram K salt	2.0	99	57
Picloram + 2,4-D	0.5 + 1.0	98	53
Picloram + 2,4-D	1.0 + 2.0	99	63
2,4-D (amine)	2.0	73	73
2,4-D (amine)	4.0	73	67
Dichlorprop	2.0	58	80
Dichlorprop	4.0	78	63
Dicamba	4.0	92	75
Dicamba	6.0	93	58
Dicamba + 2,4-D	4.0 qt	87	37
Dicamba + 2,4-D	8.0 qt	85	40
Glyphosate	2.0	88	17
Glyphosate	4.0	87	18
Glyphosate + dicamba	2.0 + 0.5	89	15
Glyphosate + dicamba	2.0 + 1.0	89	10
Glyphosate + 2,4-D (amine)	2.0 + 0.5	85	37
Glyphosate + 2,4-D (amine)	2.0 + 1.0	87	20
Maturity			
Glyphosate	2.0	20	94
Glyphosate	4.0	15	100
Glyphosate + dicamba	2.0 + 0.5	17	80
Glyphosate + dicamba	2.0 + 1.0	27	97
Glyphosate + 2,4-D (amine)	2.0 + 0.5	13	60
Glyphosate + 2,4-D (amine)	2.0 + 1.0	12	67
After frost			
Glyphosate	2.0	80	43
Glyphosate	4.0	88	50
Glyphosate + dicamba	2.0 + 0.5	80	73
Glyphosate + dicamba	2.0 + 1.0	60	52
Glyphosate + 2,4-D (amine)	2.0 + 0.5	77	45
Glyphosate + 2,4-D (amine)	2.0 + 1.0	73	42

Effect of herbicide treatments upon leafy spurge control, resistance to pull, and percent live shoots. Vore, R. E., H. P. Alley and N. E. Humburg. Visual evaluations for leafy spurge control can be misleading. Near complete control is many times recorded only to have the area reinfested with live shoots and/or germinating seeds within a span of one or two years. To better understand the control evaluations, leafy spurge plants were subjected to a resistance to pull factor ranging from 0 to 5. Zero being no resistance and 5 comparable to live plants. And excavation of 6 to 8 inches soil to determine percent live shoots.

Plots were established May 25, 1979 when the leafy spurge was in the pre-bud to bloom stage of growth. Liquid applications were applied by a garden tractor mounted spray unit in 128 gpa water carrier. Granules were applied with a hand held and operated cyclone spreader. Plots were 11 ft by 132 ft, randomized twice.

Evaluations made on June 21, 1979 included actual shoot counts to determine percentage control, resistance to pull, and percent live shoots in top 6 to 8 inches of soil. Using shoot counts to determine percentage leafy spurge control and subjecting to Duncan's multiple range test indicated that there were no significant differences between any of the picloram or picloram/2,4-D combinations in shoots per square foot except the lowest rate of the picloram/2,4-D combination. However, even though this difference did not exist, statistically, the percent live roots and resistance to pull gives a better criteria of the recoverability and reinfestation potential. Dicamba at 4.0 and 8.0 lb ai/A resulted in only 47 and 67% control, respectively, but there was less resistance to pull and less live shoots in the top 6 to 8 inches of soil than other treatments where a higher percentage control was recorded. There were no significant differences between the number of shoots per square foot in the plots treated with 0.5 lb ai/A picloram which gave 76% control and the 1.0 and 2.0 lb ai/A rate which resulted in 97 and 99+% control. There is a tremendous difference, however, in the percent live roots between these treatments, ranging from 58.3% live roots for the 0.5 lb ai/A of picloram to 0% for the 1.0 and 2.0 lb ai/A rate. Wyo. Agric. Exp. Sta., Laramie, 82071, SR 980).

Leafy spurge control, resistance to pull, and percent live shoots

Treatment	Rate lb ai/A	Shoots per ft^2	Percent control	Resistance to pull	Percent live roots[2]
picloram	0.5	2.8 ab[1]	76	3.10	58.3
picloram	1.0	0.3 a	97	0.58	0
picloram	2.0	0.1 a	99+	0.67	0
picloram (2% gran.)	0.5	1.6 ab	87	2.10	33.3
picloram (2% gran.)	1.0	0.5 a	96	1.60	16.7
picloram (2% gran.)	2.0	0.1 a	99+	0.58	0
picloram/2,4-D	0.5 + 1.0	9.8 de	16	4.67	91.6
picloram/2,4-D	1.0 + 2.0	3.4 abc	71	1.20	8.3
picloram/2,4-D	2.0 + 4.0	0.3 a	98	1.40	8.3
dicamba	4.0	6.1 c	47	1.90	25.0
dicamba	8.0	3.9 bc	67	1.00	8.3
Check	---	11.6 e	0	5.00	100

[1]Treatments with the same letter(s) are not significantly different at the 95% confidence level.
[2]Live roots in 6 to 8 inches soil.

Orange hawkweed control and forage yield responses one year after herbicide applications on pasture land in Benewah County, Idaho. Belles, W. S., D. W. Wattenbarger and W. O. Noel. Eight herbicide treatments were applied to orange hawkweed (Hieracium aurantiacum) infested pastures at two locations in Benewah County, Idaho, on June 8, 1978. Orange hawkweed was in the rosette to early flower stage at both locations. Orange hawkweed populations at location one varied from 5 to 7 plants/.1 m^2; those at location two from 14 to 22/.1 m^2. Forages at location one were white Dutch clover, Kentucky bluegrass and timothy. Forages at location two were Kentucky bluegrass, timothy and orchardgrass. Herbicides were applied with a knapsack sprayer calibrated to deliver 40 gpa total volume with water as the carrier. Treatments were replicated three times in 9 by 30 ft. plots arranged in a randomized complete block design. Treatments were evaluated visually for control and a 3 by 10 ft. area in each plot cut with a power sickle mower for measuring forage yields on July 5, 1979. Forages were separated from orange hawkweed scapes, air dried and weighed.

Control of orange hawkweed at location one was significantly greater than the untreated control for all treatments except the two rates of MCPB which were ineffective. Control of 95% or greater was obtained with picloram (K salt) at 0.6 kg ai/ha, and picloram (K salt) + 2,4-D (amine) at 0.3 + 0.6 and 0.6 + 1.1 kg ai/ha. Significant forage increases occurred with the latter picloram-2,4-D combination. Forage responses at location one were less than at location two because of lower orange hawkweed populations and the herbicide-susceptible white Dutch clover at location one.

At location two, orange hawkweed control of 95% or greater was obtained with picloram (K salt) at 0.3 and 0.6 kg ai/ha, picloram (K salt) + 2,4-D (amine) at 0.3 + 0.6 and 0.6 + 1.1 kg ai/ha, and with dicamba + 2,4-D (amine) at 0.6 + 3.3 kg ai/ha. Forage yields were zero in the control and the MCPB at 0.8 kg/ha treated plots where solid orange hawkweed stands completely suppressed desirable forage growth. Yields of approximately 2000 kg/ha were obtained on the plots where 95% or greater control occurred.

Effect of four herbicides applied in 1978 on orange hawkweed control and forage yields at two locations

		Location one		Location two	
Herbicide	Rate	Forage Wt.	O. hawkweed control	Forage Wt.	O. hawkweed control
	(kg ai/ha)	(kg/ha)	(%)	(kg/ha)	(%)
Picloram (K salt)	0.3	451abc[1]	82a	2038a	97a
Picloram (K salt)	0.6	618ab	99a	2044a	100a
MCPB	0.8	317c	0c	0b	0c
MCPB	1.7	308c	0c	41b	0c
Picloram (K salt) + 2,4-D (amine)	0.3 + 0.6	586ab	95a	2076a	100a
Picloram (K salt) + 2,4-D (amine)	0.6 + 1.1	673a	100a	2104a	100a
Dicamba + 2,4-D (amine)	0.6 + 1.7	589ab	52b	981ab	85b
Dicamba + 2,4-D (amine)	0.6 + 3.3	463abc	83a	1902a	99a
Control	0.0	386bc	0c	0b	0c

[1] Values followed by a common letter within a column are not significantly different at the 5% level according to Duncan's multiple range test.

Quackgrass control one year after herbicide applications. Belles, W. S., D. W. Wattenbarger and W. O. Noel. Herbicide applications were made in 1978 on a quackgrass infested hay field in Bonner County, Idaho. Treatments were applied at three times during the season: the 4 leaf stage, at heading and after two light frosts. The after frost treatment had been mowed when in the heading stage and quackgrass was in the boot stage at the time of application. Plots were 18 x 30 feet and arranged in a randomized complete block design with three replications. Treatments were applied with a knapsack sprayer at 20 gpa. The plot area was plowed in October and left rough over winter. A seedbed was prepared in May of 1979 and seeded to oats. Plots were visually evaluated for quackgrass control on August 10.

Significant quackgrass control was obtained at the 4-leaf and headed growth stages with all treatments except dalapon at 8.0 lb ai/A and with all treatments applied after frost, except dalapon at 8.0 lb ai/A and the glyphosate + 2,4-D (amine) combination at .50 + 10 lb ai/A. Combination treatments of glyphosate + Dicamba or 2,4-D did not significantly increase quackgrass control at any growth stage compared to glyphosate alone.

Although generally not significantly different at the 5% level average control values indicated that the 1.0 lb ai/A rate of glyphosate gave better control than the .50 lb ai/A rate and applications at the headed and after frost applications were better than applications at the 4-leaf stage.

Quackgrass control one year after herbicide applications

Treatment	Rate	Control[2/] Quackgrass
	(lb ai/A)	——(%)——
4-leaf stage (May 18, 1978)		
Glyphosate	.50	37c-g
Glyphosate	1.0	65a-e
Glyphosate + dicamba	.50 + .50	35e-g
Glyphosate + dicamba	.50 + 1.0	35e-g
Glyphosate + 2,4-D (amine)	.50 + .50	51c-f
Glyphosate + 2,4-D (amine)	.50 + 1.0	38e-g
Dalapon	8.0	20f-h
Control	0	0h
Headed stage (June 26, 1978)		
Glyphosate	.50	75a-d
Glyphosate	1.0	91ab
Glyphosate + dicamba	.50 + .50	68a-e
Glyphosate + dicamba	.50 + 1.0	40e-g
Glyphosate + 2,4-D (amine)	.50 + .50	46d-g
Glyphosate + 2,4-d (amine	.50 + 1.0	61a-e
Dalapon	8.0	27f-h
Control	0	0h
After frost (September 19, 1978)		
Glyphosate	.50	81a-c
Glyphosate	1.0	94a
Glyphosate + dicamba	.50 + .50	81a-c
Glyphosate + dicamba	.50 + 1.0	60b-e
Glyphosate + 2,4-D (amine)	.50 + .50	65a-e
Glyphosate + 2,4-D (amine)	.50 + 1.0	25f-h
Dalapon	8.0	14gh
Control	0	0h

Quackgrass control with tank mixtures of dicamba and glyphosate. Whitesides, Ralph E. Two field trials were established to compare quackgrass control with glyphosate against a tank mixture of dicamba and glyphosate. A trial was located in western Oregon (near Sheridan) and the other in central Oregon (near Prineville). Both trials were randomized complete blocks with four replications. Plot size was 10 by 20 ft., and herbicide application was made May 18 (Sheridan) and May 31, (Prineville) 1979. At treatment time, quackgrass had 4 to 6 leaves and was actively growing.

Evaluation August 7 and 10, 1979, indicated quackgrass control from 0.75 lb ae/A glyphosate was 75% (Sheridan) and 40% (Prineville). The addition of 2 lb ae/A dicamba gave 71% (Sheridan) and 14% (Prineville) control of quackgrass. The addition of dicamba to the spray solution did not increase the activity of glyphosate in controlling quackgrass. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

The effect of fall and spring applied herbicides on rush skeletonweed control and forage production in Gem County, Idaho. Belles, W. S., D. W. Wattenbarger and G. A. Lee. Rush skeletonweed presently infests large areas of rangeland inIdaho, Washington, and Oregon and threatens to invade cultivated areas of these states. Experiments were established on May 9 and October 5, 1977 near Banks, Idaho on adjacent rangeland sites to determine the effectiveness of spring and fall applied herbicides for the control of rush skeletonweed. Herbicides were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 40 gpa of water carrier. A randomized complete block design with three replications was used with 9 by 30 ft. plots for each experiment. When treated, the rush skeletonweed was in the rosett stage and about 4-6 inches in diameter at both dates. Soil moisture was 50%, soil temperature 55 and 49 F, air temperature 70 F and 50 F and relative humidity 80%, respectively, for the spring and fall treatments at application time. A shower fell on the spring site within 24 hours of application. Spring treated plots were evaluated for rush skeletonweed control on October 5, 1977 and June 6, 1978. The number of plants per sq. ft. was determined on the October evaluation from two randomly placed 2 by 5 ft. quadrats per plot. These values were then converted to percent of the untreated control. Percent control was determined visually at the June evaluation. Fall treated plots were evaluated visually on June 6, 1978. Both spring and fall treated plots were harvested June 1, 1978 to determine dry matter production of rush skeletonweed and grass which was primarily bulbous bluegrass, *Poa bulbosa*. An area 3 by 24 ft. was cut from the center of each plot. The plant material obtained within each plot was mixed and subsampled. Each subsample was then separated into rush skeletonweed and grass, dried and weighed.

Rush skeletonweed control on October 5, 1977, five months after application was significant (5% level) with all picloram treatments, picloram plus 2,4-D combinations, dicamba at 1.0 and 2.0 lb ai/A and dichlorprop at 2.0 lb ai/A compared to the untreated control (Table 1). The following June, 13 months after treatment significant control was obtained with picloram 2% beads at .25 and .5 lb ai/A, picloram 5% beads at .5 lb ai/A, picloram plus 2,4-D at .25 plus .5 lb ai/A and .5 plus 2.0 lb ai/A, and picloram at .25 and .5 lb ai/A. Chemicals with less residual than picloram such as dicamba were notable poorer on the latter evaluation.

Dry matter production of rush skeletonweed was significantly reduced by the picloram 2% bead treatments, picloram plus 2,4-D combinations of .25 plus .5 and .5 plus 2.0 lb ai/A, and picloram at .5 lb/A. A significant increase was found with dicamba at 1.0 lb ai/A. Earlier field counts showed an increase in rosettes with the dicamba treatment. Apparently top growth injury was sufficient to stimulate bud development at or below the crowns. Dry weight of grass, which was almost entirely bulbous bluegrass, was significantly increased over the control by five treatments. These were picloram plus 2,4-D at .125 plus .25, .25 plus 1.0 and .50 plus 2.0 lb ai/A, picloram at .25 lb ai/A and dicamba at 2.0 lb ai/A. Yield increases for these treatments ranged from approximately 200 to 275% of the untreated control.

The results of fall applied herbicides are in Table 2. Percent control of rush skeletonweed (June 6, 1978) was significant for all chemical treatments except the low rates of dichlorprop and glyphosate. All picloram and picloram plus 2,4-D treatments resulted in 88 to 100 % control. Applications of dicamba and 2,4-D were less effective. Grass yield increases were generally not significant at the 5% level. Considerable variation occurred in the experiment, possibly due in part, to measuring techniques which negated significance for rather large numerical yield increases.

Fall applications of herbicides, to date, appear superior to spring applications for the control of rush skeletonweed. Yield of desirable forage has been shown to be reduced by as much as 275%. Further work has been initiated to assess other chemical control measures.

Table 1. The effect of spring applied herbicides on rush skeletonweed control and dry matter production and on grass yields.[1/]

Treatment	Rate lb ai/A	% Control		Dry Matter (lb/A)	
		10/5/77	6/6/78	Rush Skeletonweed	Grass
Control	0	0g[1/]	0f	1041b-e	838e-f
Picloram (2% beads)	0.25	87ab	57a-c	331f-i	532g-f
Picloram (2% beads)	0.50	74a-d	60a-c	318g-i	540g-f
Picloram (5% beads)	0.25	48a-f	30c-f	612c-i	531c-g
Picloram (5% beads)	0.50	51a-f	50c-d	720c-i	947d-f
Glyphosate	3.0	18fg	12ef	1123a-d	346g
Glyphosate	4.0	35c-g	22d-f	1074b-d	219g
Picloram (K salt) + 2,4-D (amine)	0.125 + 0.25	89ab	23d-f	585c-i	2038ab
Picloram (K salt) + 2,4-D (amine)	0.25 + 0.5	92a	62a-c	286g-i	1454a-e
Picloram (K salt)	0.25	91a	38c-e	350e-i	2285a
Picloram (K salt)	0.50	72a-e	78ab	74i	1458a-e
2,4-D (amine)	1.0	34c-g	8ef	956b-g	815e-g
2,4-D (amine)	2.0	15fg	5ef	1497ab	818e-g
2,4-D (LVE)	1.0	25e-g	10ef	1284a-c	1382b-f
2,4-D (LVE)	2.0	10d-g	3f	818b-h	714e-g
Dicamba	1.0	58a-f	3f	1758a	1068c-g
Dicamba	2.0	76a-c	23d-f	1037b-f	1784a-d
Dicamba + 2,4-D (amine)	0.5 + 1.5	30c-g	5ef	428d-i	559fg
Dicamba + 2,4-D (amine)	1.0 + 3.0	41c-g	20d-f	1244a-c	835e-g
Picloram (K salt) + 2,4-D (amine)	0.25 lb + 1.0	85ab	33c-f	1061b-d	1863a-c
Picloram (K salt) + 2,4-D (amine)	0.5 lb + 2.0	92a	83a	225hi	2292a
Dichlorprop	1.0	31c-g	15ef	531d-i	1266b-f
Dichlorprop	2.0	74a-e	33c-f	975b-g	692e-g

[1/] Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Table 2. The effect of fall applied herbicides on dry matter production of rush skeletonweed and grass.

Treatment	Rate lb ai/A	Dry matter (lb/A) Grass	Dry matter (lb/A) Skeletonweed	% Control[1/] (6/6/78)
Picloram (2% beads)	0.25	173c[1/]	15d	97a
Picloram (2% beads)	0.50	1387ab	0d	100a
Picloram (5% beads)	0.25	819a-c	0d	88a
Picloram (5% beads)	0.50	1799a	375ab	96a
Glyphosate	3.0 qt	602bc	96b-d	16fg
Glyphosate	4.0 qt	281bc	205a-d	43c-e
Picloram (K salt) + 2,4-D (amine)	0.125 + 0.25	1388ab	331a-c	95a
Picloram (K salt) + 2,4-D (amine)	0.25 + 0.50	415bc	0d	98a
Picloram (K salt)	0.25	563bc	0d	98a
Picloram (K salt)	0.50	524bc	0d	99a
2,4-D (amine)	1.0	473bc	52cd	40de
2,4-D (amine)	2.0	384bc	60cd	56cd
2,4-D (LVE)	1.0	641bc	73cd	28ef
2,4-D (LVE)	2.0	666bc	57cd	31ef
Dicamba	1.0	257bc	11d	78ab
Dicamba	2.0	930a-c	7d	81ab
Dicamba + 2,4-D (amine)	0.5 + 1.5	830a-c	15d	63bc
Dicamba + 2,4-D (amine)	1.0 + 3.0	246bc	4d	55cd
Picloram (K salt) + 2,4-D (amine)	0.25 + 1.0	1116a-c	0d	99a
Picloram (K salt) + 2,4-D (amine)	0.5 + 2.0	975a-c	0d	100a
Dichlorprop	1.0	532bc	407a	2g
Dichlorprop	2.0	124c	297a-c	30ef
Control	0	384bc	185a-c	0g

[1/] Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Rush skeletonweed herbicide trials applied in the spring of 1978. Wattenbarger, D. W., W. S. Belles and G. A. Lee. Twenty-four herbicide treatments were applied to a rush skeletonweed infested range in the spring of 1978 near Garden Valley, Idaho. Picloram (K salt) and granules were applied April 18; the remaining treatments June 6. Treatments were applied to 9 by 30 ft. plots and replicated three times in a randomized complete block design. Granular materials were applied by hand after mixing with soil. Liquid applications were made with a knapsack sprayer equipped with a 3-nozzle boom calibrated to deliver 40 gpa with water as the carrier.

Soil in the area was a gravely silt loam. The treated area was on a gentle slope with a southwest exposure. On April 18, rush skeletonweed rosettes were from 1/2 to 6 inches in diameter. Soil moisture was 50-60% below a dry 1/8 in top layer. Relative humidity was 55%, soil temperature at 4 inches was 54 F and air temperature was 56 F. The wind was gusty from 0 to 4 mph; the sky clear. Because of wind condition changes most liquids were not applied until June 6. Rush skeletonweed plants at that time were in a bolted pre-flower stage. There were approximately 10 plants per sq. ft. at both dates of application. Climatic conditions on June 6 were: air temperature 65 F, relative humidity 30% and wind 0 to 2 mph from the north. The soil was moist to 6 inches; soil temperature was not determined. Repeat applications of 2,4-D were not applied in the fall of 1978. Fall moisture was insufficient for seedling establishment and rosette growth.

Preliminary evaluations were made in the fall of 1978 to determine top growth kill and vigor reduction of rush skeletonweed plants. Treatments with picloram and DOWCO 290 gave the best results at this early evaluation. Dicamba plus 2,4-D amine at 1.0 + 3.0 lb ai/A also was quite effective. Evaluations were made on April 26 and October 15, 1979 to determine actual stand reductions of established plants, and soil residual effects on seedling establishment.

Picloram in liquid and dry formulations and in combination with 2,4-D (amine) resulted in control of 80% or better one year after application. DOWCO 290 at .5 + 1.0 lb ai/A and DOWCO 290 + 2,4-D also gave 80% or better control of rush skeletonweed plants. Dichlorprop, dicamba and 2,4-D (amine) did not provide adequate control.

Evaluations 18 months after application showed that picloram (K salt) and picloram (granular materials) were still providing better than 80% control. New fall rosettes were present at this time indicating good residual control with picloram at rates of .5 and 1.0 lb ai/A. Combinations of picloram + 2,4-D at .125 + .25 and .25 + .5 lb ai/A resulted in reduced control compared to earlier (April 26) evaluations or higher rates of picloram alone. DOWCO 290 alone and in combination with 2,4-D showed a similar reduction in control with time which indicates a lack of residual activity necessary for long term control. The other herbicides tested resulted in essentially no control after 18 months.

Herbicide control of rush skeletonweed 12 and 18 months after application in 1978.

Treatment	Rate	Control 4/26/79	Control 10/15/79
	(lb ai/A)	(%)	(%)
Control	0	0	0
Picloram (2% pellets)[1/]	0.50	94	85
Picloram (2% pellets)	1.0	93	92
Picloram (2% beads)	0.50	96	88
Picloram (2% beads)	1.0	99	94
Picloram (5% pellets)	0.50	82	82
Picloram (5% pellets)	1.0	99	99
Picloram (K salt)	0.50	98	93
Picloram (K salt)	1.0	99	92
Picloram (K salt) + 2,4-D (amine)	0.125 + 0.25	80	57
Picloram (K salt) + 2,4-D (amine)	0.25 + 0.50	96	78
Dichlorprop	1.0	0	2
Dichlorprop	2.0	2	0
Dicamba	1.0	2	0
Dicamba	2.0	13	0
Dicamba + 2,4-D (amine)	0.50 + 1.50	0	0
Dicamba + 2,4-D (amine)	1.0 + 3.0	0	0
2,4-D (amine)	1.0	0	3
2,4-D (amine)	2.0	7	2
2,4-D (amine) spring/fall[2]	1.0 + 1.0	0	3
2,4-D (amine) spring/fall[2]	2.0 + 2.0	0	0
DOWCO 290	0.50	86	63
DOWCO 290	1.0	99	78
DOWCO 290 + 2,4-D	0.25 + 1.0	50	40
DOWCO 290 + 2,4-D	0.50 + 2.0	85	73

1/ Picloram dry and K salt formulations applied 4/18/78; remainder of herbicides applied 6/6/78.

2/ Spring application only applied.

Russian knapweed control with postemergence herbicides. Blank, S. E. In late July, 1978 postemergence herbicide treatments were applied to uniform stands of Russian knapweed at two locations near Ontario, Oregon and Paris, Idaho. Treatments were made when the knapweed was in an early bloom stage of growth. Chemicals were applied utilizing a CO_2 pressurized backpack sprayer with a 6 ft boom calibrated to deliver 20 gpa. The 8 ft by 20 ft field plots were replicated three times in a randomized complete block design in both trials. The air temperature at herbicide application time was 81 F at Ontario, Oregon and 103 F at Paris, Idaho. Both experimental sites were located in non-irrigated pastures in regions characterized by semi-arid to arid climates. All treatments were visually evaluated in the fall of 1978 and early summer of 1979 for percent weed control when compared to an untreated check plot. (Monsanto Agricultural Products Company, St. Louis, Missouri 63166)

The commercial formulation containing the isoproplyamine salt of glyphosate (IPA glyphosate) and dicamba provided acceptable control of Russian knapweed. Based upon late July treatments at an early flowering stage of growth, 2.25 lb ae/A or more IPA glyphosate was needed to achieve adequate control. A combination with additional surfactant did not influence IPA glyphosate efficacy on Russian knapweed. None of the chemicals evaluated were effective in providing initial, first year control of knapweed. This was likely due to the extremely dry conditions and resultant inactive growth characterizing the knapweed at the time applications were made.

Russian knapweed control with postemergence herbicides applied in 1978

Herbicide	Rate 2/ lb/A	Percent Control 1/ Time of Evaluation August 1978	May-June 1979
IPA glyphosate	1.5	15	81
IPA glyphosate	2.25	28	88
IPA glyphosate	3.0	44	93
IPA glyphosate	3.75	65	96
IPA glyphosate	4.5	67	95
IPA glyphosate + X-77 surfactant	1.5+0.5%(v/v)	26	82
IPA glyphosate + X-77 surfactant	3.0+0.5%(v/v)	42	92
Dicamba	6.0	66	100
2,4-D amine + dicamba	3.0+1.0	49	58

1/ Values are averages of two locations, each containing three replications; treatments applied late July, 1978.

2/ IPA glyphosate rates expressed as lb ae/A; 2,4-D amine and dicamba rates expressed as lb ai/A.

Russian knapweed control in pasture. Whitesides, Ralph E., Bill D. Brewster, Arnold P. Appleby and Patrick K. Boren. A field trial was established in a central Oregon grass pasture to compare the control of Russian knapweed, at two stages of growth, from several herbicides. The trial was a randomized complete block with three replications. Herbicides were applied in May, June and July of 1978. Treatments in May were to vegetative knapweed plants and June treatments were to plants in the bud stage of growth.

Evaluation made May 31, 1979, show that early application of 2,4-D, glyphosate and triclopyr were less effective than treatment at the bud stage. Control using dicamba was slightly better from early treatments than from late treatments. Control using 5.0 kg ai/ha triclopyr was 81% (vegetative) and 91% (bud). Glyphosate was ineffective at 4.0 kg ae/ha early and gave 17% control when applied in the bud stage. Dicamba (7.0 kg ae/ha) was consistent, with control ratings of 88% (vegetative) and 83% (bud). Early application of 2,4-D LVE (10 kg ae/ha) gave 8% control while a June application at the same rate gave 62% control. The outstanding treatment for the trial, however, was a split application of 2,4-D. When 5.0 kg ae/ha of 2,4-D LVE was applied in June (bud stage) and followed three weeks later with another application of 2,4-D LVE (same rate) control was 91%. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Evaluation of herbicides for control of seaside arrowgrass (*Triglochin maritima*). Alley, H. P. and N. E. Humburg. Arrowgrass is a very important component in irrigated mountain meadows of the west. It is a poisonous plant, its poisonous properties being due to hydrocyanic acid. Since it is dangerous from early spring to late fall and can retain its toxic properties in cured hay, ranch operators are anxious to find an effective herbicidal control measure.

Exploratory herbicide treatments were established September 5, 1978 to a solid stand of arrowgrass which was fully mature, growing in a swampy wet area. All treatments were applied with a 6-nozzle hand held knapsack unit in 40 gpa water carrier.

Visual control evaluations made August 14, 1979, indicated that 2,4-D amine at 4.0 to 6.0 lb ai/A was the only effective herbicide applied giving 96 and 98% reduction in stand, respectively. Dicamba or picloram was not effective and afforded no control at the rates applied. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 978).

Herbicide and seaside arrowgrass control

Herbicide	Rate lb ai/A	Percent Control
2,4-D A	2.0	0
2,4-D A	4.0	96
2,4-D A	6.0	98
dicamba	2.0	0
picloram	0.5	0
picloram	1.0	0

Tansy (*Tanacetum vulgare*) control in pasture thirty months after application. Belles, W. S., and D. W. Wattenbarger. Herbicide treatments were applied to a tansy-infested clover-Canada bluegrass pasture on May 5, 1977. Plot size was 9 by 30 ft. with each treatment replicated three times in a randomized complete block design. Tansy plants were 4 to 6 in. tall and averaged 24 plants/sq. ft. Liquid herbicides were applied with a knapsack sprayer at 40 gpa with water as the carrier. Granules were applied by hand.

Control of tansy by herbicides 30 months after application was evaluated by visual evaluations on November 2, 1979. Only 2 treatments maintained a 91% or better control; picloram at 2.0 lb ai/a and picloram plus 2,4-D at 1.0 plus 2.0 lb ai/a. Picloram 2% beads and 5% pellets at 2.0 lb ai/a resulted in a residual control of better than 80%. All other chemicals and rates resulted in less than 80% control 30 months after application.

Tansy control 30 months after herbicide application

Treatment	Rate	Control (11/2/79)
	(lb ai/A)	%
Asulam	2.0	3
Asulam	3.0	7
Asulam	6.0	0
Picloram (2% beads)	1.0	68
Picloram (2% beads)	2.0	82
Picloram (2% pellets)	1.0	33
Picloram (2% pellets)	2.0	88
Picloram (K salt)	1.0	70
Picloram (K salt)	2.0	94
Picloram (K salt) + 2,4-D (amine)	0.5 + 1.0	70
Picloram (K salt) + 2,4-D (amine)	1.0 + 2.0	91
2,4-D (LVE)	2.0	33
Dichlorprop	3.0	40
Dichlorprop	4.0	70
Bentazon	2.0	0
Bentazon	4.0	3
Glyphosate	3.0	5
Glyphosate	4.0	10
Dicamba + 2,4-D (amine)	1.0 + 3.0	30
Dicamba + 2,4-D (amine)	2.0 + 6.0	27
Control	0	0

Chemical control of tansy (*Tanacetum vulgare*) in Bonner County, Idaho. Belles, W. S. and D. W. Wattenbarger. A study was initiated May 18, 1978 to determine the effect of herbicide treatments on tansy control and subsequent hay yields. The experiment was established on a tansy infested (5 plants/sq. ft.) hay field consisting of a grass-legume mixture which was seeded in 1977. Treatments were replicated three times in 9 by 30 ft. plots replicated three times in a randomized complete block design. Liquid materials were applied with a knapsack sprayer at 40 gpa total volume with water as the carrier. Dry materials were broadcast by hand. Plots were hand-harvested on July, 1978 and again on September 9, 1979 with a power sickle mower. Tansy and desirable forage were separated from the 3 by 24 ft. harvested area, air dried and weighed. Data from the 1978 harvest was reported in 1978. Visual evaluations of tansy control were also made on September 9, 1979.

Tansy dry weights were substantially reduced, compared to the control, with all herbicide treatments. Weight reduction ranged from 40% with 1.0 lb ai/A of picloram 5% pellets to 100% with 2.0 lb ai/A of picloram (2% pellets), 2.0 lb ai/A of picloram (5% pellets), 0.5, 1.0 and 2.0 lb ai/A of picloram (K salt), 1.0 + 2.0 lb ai/A of picloram (K salt) + 2,4-D (amine) and 2.0 + 6.0 lb ai/A of dicamba + 2,4-D (amine).

Forage yields were increased 300 to 850 lb/A with all herbicides except the dry picloram materials excluding the 1.0 lb ai/A rate of picloram (2% beads). The 2.0 lb ai/A rate of picloram (2% beads) and all other dry materials either resulted in slight yield decreases or no differences compared to the control. These materials caused some noticeable injury symptoms to the newly established grasses as well as legumes when treated in early 1978. All treatments reduced legumes compared to the control.

Visual evaluations of tansy stand and vigor reduction showed 90% or better control with eight of the 17 herbicide treatments. These were picloram (2% beads) at 1.0 lb ai/A, picloram (2% and 5% pellets) at 2.0 lb ai/A, picloram (K salt) at 0.5, 1.0 and 2.0 lb ai/A, picloram (K salt) + 2,4-D (amine) at 0.6 + 1.0 and 1.0 + 2.0 lb ai/A and dicamba at 4.0 lb ai/A. Only dicamba at 2.0 lb ai/A and two of the granular treatments resulted in less than 80% control.

Effect of herbicide application on tansy control and forage yields

Treatment	Rate	Plant dry weights[2] Tansy	Plant dry weights[2] Forage	Tansy Control[2]
	(lb ai/A)	(lb/A)		(%)
Control	0	257	1490	0
Picloram (2% beads)	1.0	27	1775	98
Picloram (2% beads)	2.0	56	1353	75
Picloram (2% pellets)	1.0	94	1426	80
Picloram (2% pellets)	2.0	0	1397	99
Picloram (5% pellets)	1.0	155	1426	68
Picloram (5% pellets)	2.0	0	1490	96
Picloram (K salt)	0.5	0	2046	92
Picloram (K salt)	1.0	0	1870	99
Picloram (K salt)	2.0	0	1928	100
Picloram (K salt) + 2,4-D (amine)	0.25 + 0.5	26	1708	87
Picloram (K salt) + 2,4-D (amine)	0.5 + 1.0	38	1797	99
Picloram (K salt) + 2,4-D (amine)	1.0 + 2.0	0	1967	100
Dichlorprop	4.0	27	1829	83
Dicamba	2.0	97	2008	70
Dicamba	4.0	8	2345	93
Dicamba + 2,4-D (amine)	1.0 + 3.0	28	1922	83
Dicamba + 2,4-D (amine)	2.0 + 6.0	0	1887	88

[1]Treatments applied May 18, 1978.

[2]Harvest data and visual evaluations taken on September 9, 1979.

The effect of drift levels of postemergence herbicides on crops. Lange, A. H. In herbicide drift studies it is important to know what constitutes "no effect" levels and how crop plants respond to herbicides at low levels of postemergence herbicides. The object of this study was to quantify low level effects for dicamba on four annual crops.

Young seedling crop plots in the four inch stage growing in individual pots in a greenhouse were carfully sprayed with herbicides in 100 gpa rate in a five foot by five foot square area in a field road outside in green house. Each treatment was replicated 10 times. Before the plants were weighed at the end of the experiment, the most atypical plants were discarded, so that only nine replications were cut at ground level and weighed.

The results with low level rates of dicamba showed that young alfalfa plants were most sensitive. Sugar beets were next, lettuce third and spinach most tolerant symptomwise. About the same relationship held for the fresh weights. The no effect level was between 1/128 and 1/256 lb ai/A for all crops except alfalfa. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

Table 1. The effect of low concentrations of herbicides on four crops

		Average 1/ Drift Phytotoxicity			
Herbicides	lb/A 2/	Lettuce	Alfalfa	Sugar Beets	Spinach
Dicamba	0.125	4.8	5.7	5.9	4.8
Dicamba	0.06	3.7	4.7	4.6	3.9
Dicamba	0.012	1.8	4.4	4.0	2.8
Dicamba	0.006	1.1	3.3	2.0	1.0
Dicamba	0.0012	0.4	1.2	0.9	0.0
Dicamba	0.0006	0.0	1.2	0.1	0.0
2,4-D	0.125	2.7	1.3	4.0	3.9
2,4-D	0.06	2.0	1.4	3.9	3.2
Check	-	0.0	0.0	0.0	0.0
Check	-	0.0	0.0	0.0	0.0

1/ Average of 10 individual plant reps. where 0 = no effect, 10 = complete kill, 2 = recognizable symptoms, 5 = symptoms and 50% stunting.

2/ Sprayed at 100 gpa in a 5 by 5 foot plot.

Table 2. The effect of drift amounts of two herbicides on five crops in the vegetative stage as determined by fresh weights

		Average[1/] Fresh Weights (Grams)				
Herbicides	lb/A	Lettuce	Alfalfa	Sugar Beets	Spinach	Barley
Dicamba	0.125	32.4	5.9	7.6	13.2	6.3
Dicamba	0.06	29.2	6.1	7.8	15.8	6.8
Dicamba	0.012	35.6	7.3	8.6	16.1	6.7
Dicamba	0.006	43.7	12.0	7.8	11.0	7.4
Dicamba	0.0012	41.3	13.9	9.7	9.8	6.9
Dicamba	0.0006	43.7	14.1	9.1	11.0	8.4
2,4-D	0.125	39.3	10.1	8.8	10.2	6.0
2,4-D	0.06	33.7	10.2	8.6	12.3	6.0
Check	-	38.0	14.4	9.0	10.1	7.6
Check	-	36.7	13.8	7.9	11.3	8.2

1/ Average of 9 replications cut at the soil surface.

PROJECT 2

HERBACEOUS WEEDS OF RANGE AND FOREST

W. S. Belles, Project Chairman

SUMMARY -

Fourteen papers were submitted for publication. Herbaceous range and forest weeds included black sagebrush, broom snakeweed, crupina, duncecap larkspur, plains prickly pear, rush skeletonweed, Scotch thistle, spotted knapweed, spreading wild buckwheat and yellow starthistle.

Black Sagebrush

Dicamba 4S and PPG 225 at 2.0 and 4.0 lb ai/A effectively controlled black sagebrush in the bud stage of growth. Dicamba 4S was more effective than dry formulations. The addition of 2,4-D to dicamba did not improve black sagebrush control.

Crupina

Crupina vulgaris, a new range weed in Idaho, was effectively controlled with glyphosate, dicamba, 2,4-D (amine) and picloram applied in the spring or fall. Control of 100% more than one year after application was obtained with fall-applied dicamba at 4.0 lb ai/A, and spring-applied glyphosate at 1.0 and 2.0 lb ai/A, 2,4-D (amine) at 1.0 and 4.0 lb ai/A, picloram (K-salt) at .25 and .50 lb ai/A and picloram (K-salt) + 2,4-D (amine) at .25 + 1.0 lb ai/A.

Duncecap Larkspur

IPA glyphosate applied postemergence to duncecap larkspur at 3.0, 3.75 and 3.5 ae/A resulted in 92% or better control one year after application. The addition of X-77 did not affect control by glyphosate. Dicamba at 6.0 lb ai/A and dicamba + 2,4-D (amine) at 1.0 + 3.0 lb ai/A did not give adequate control.

Broom Snakeweed and Plains Prickly Pear

Broom snakeweed in the full bloom stage of growth at treatment was unaffected by dichlorprop at 2.0 and 3.0 lb ai/A, dichlorprop + 2,4-D at 1.0 + 1.0 and 1.5 + 1.5 lb ai/A, silvex at 1.0 and 2.0 lb ai/A and picloram at .25 lb ai/A. Picloram at .5 lb ai/A and picloram + 2,4,5-T at 0.5 + 0.5 lb ai/A gave 50 and 75% control, respectively. Plains prickly pear control of 92% or better was obtained with picloram at .25 and .5 lb ai/A and the picloram-2,4,5-T combination.

Rush Skeletonweed

Several hormone herbicides applied to rush skeletonweed in the bud to early flower stage of growth were effective in reducing seed germination percent. Percent reductions of 90% or better were obtained with dicamba at .25 lb ai/A, dicamba + 2,4-D at .125 + .25 lb ai/A, and picloram at .125 lb ai/A.

Scotch Thistle

Seed production was effectively reduced by several herbicides applied to scotch thistle in the rosette stage. Picloram was the only compound giving acceptable control of plants twelve months after application.

Spotted Knapweed (four papers)

Data from spotted knapweed trials from one southern Idaho location and three northern Idaho locations were reported. In general, picloram (K-salt) and dicamba provided the best control of herbicides tested. The addition of 2,4-D to either picloram (K-salt) or dicamba did not appreciably affect control. Forage responses from herbicidally controlled spotted knapweed was dramatic in most cases with increases up to twelve-fold achieved. Fertilizer (ammonium sulfate) generally increased both forage and spotted knapweed. In plots where spotted knapweed was not well controlled, added fertilizer appeared to favor spotted knapweed growth over forage growth.

Spreading Wild Buckwheat

Herbicides were applied to plants stunted by drought conditions which were in near full leaf stage of growth. Control of 80% or better two years after application without grass injury was obtained with dicamba XP 10% at 2.0 and 4.0 lb ai/A, dicamba + 2,4-D at 1.0 + 2.0, 2,4,5-T at 2.0 lb ai/A and picloram + 2,4-D at .25 + .5 and .5 + 1.0 lb ai/A.

Yellow Starthistle (three papers)

In a California trial, picloram at .125, .25 and .63 lb ai/A and dicamba at .25, .5 and .75 lb ai/A gave excellent control when applied at two stages of growth. Both amine and ester 2,4-D formulations at .75 lb ai/A gave good results when applied when plants were 2 to 6 cm tall in the five-leaf stage. Nitrogen at 65 lb/A as a separate treatment reduced yellow starthistle plants compared to the control.

In trials initiated in northern Idaho in 1978 excellent control one month later was obtained with picloram (2% pellets) at .5 lb ai/A, picloram (K-salt) at .25 and .5 lb ai/A, picloram (K-salt) + 2,4-D (amine) at .125 + .25 and .25 + .5 lb ai/A, dicamba at 1.0 and 2.0 lb ai/A and dicamba + 2,4-D (amine) at 0.5 + 1.5 and 1.0 + 3.0 lb ai/A. Eighteen months after treatment only one treatment picloram (K-salt) at .5 lb ai/A gave effective control. Forage yields were nearly doubled by some treatments four months after application. Trials in 1979 resulted in 96% or better control five months after application with several treatments including picloram (K-salt), dicamba and dicamba + X-77, dicambe + 2,4-D and dicamba + X-77 + 2,4-D.

Post emergence herbicides for johnsongrass control in cotton

Treatments	Rate lb/A	Treat-ment date 1/	Cotton response 7/19/79 % vigor reduction	Johnsongrass control 2/ % cotton reduction 6/19/79	7/19/79
Hoed (farmer's field)			0	85%	
Check (unhoed)		1	36.3	23	18.8
"		2	53.8	10	0
Chevron KK-80	1.0	1	23.8	23	5.0
"		2	35.0	8	38.8
Chevron KK-80	2.0	1	36.3	38	13.8
"		2	55.0	20	31.7
Dalapon	5.0	1	32.5	40	13.8
"		2	75.0	30	31.3
Dalapon	10.0	1	52.5	70	33.8
"		2	85.0	35	85.0
BASF 9052 OH	1.0	1	13.8	70	58.8
"		2	37.5	38	45.8
BASF 9052 OH	2.0	1	15.0	68	69.5
"		2	30.0	48	78.8
MBR 18337	1.0	1	65.0	38	2.5
"		2	50.0	23	40.0
MBR 18337	2.0	1	41.5	60	37.5
"		2	55.0	43	58.3

1/ Treatment dates: 5/10/79 and 6/19/79.

2/ Johnsongrass control 0-10: 0 = no control; 10 = complete kill. (Only treatment date one was treated on 6/19/79.).

Herbicide evaluation for control of black sagebrush. Alley, H. P., R. E. Vore and N. E. Humburg. Control of black sagebrush with 2,4-D has been erratic in the past. The nature of its growth on dry, shallow soil sites and resprouting ability has been cited as the major reasons for unpredictable results. The response of black sagebrush to three formulations of dicamba, two mixtures of dicamba/2,4-D, 2,4,-D PGBE ester and PPG 225 was evaluated. Liquid formulations were applied with a 6-nozzle knapsack sprayer in 40 gpa total volume of water carrier. The black sagebrush was 10 to 12 inches tall and in the bud-stage of growth at time of treatment.

Visual evaluations made on July 2, 1979, one year following treatment, indicated that dicamba 4S was more effective at the 2 lb ai/A rate of application than the dry formulations. There were no appreciable differences between the dicamba/2,4-D combinations when applied at equivalent rates of dicamba, the amount of 2,4-D in the mixture did not seem to effect the activity. PPG 225 at 2.0 lb ai/A gave 98% control and should be evaluated at lower rates. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 973).

Herbicides and black sage control

Herbicide[1]	Rate lb ai/A	Percent control
dicamba 5G	2.0	50
dicamba 5G	4.0	90
dicamba XP 10%	2.0	40
dicamba XP 10%	4.0	75
dicamba 4S	2.0	95
dicamba 4S	4.0	100
dicamba/2,4-D[2]	1.0 + 2.0	80
dicamba/2,4-D	2.0 + 4.0	95
dicamba/2,4-D[3]	1.0 + 3.0	85
dicamba/2,4-D	2.0 + 6.0	98
PPG 225	2.0	98
PPG 225	4.0	100
2,4-D PGBE	2.0	20

[1]Treated July 10, 1978; evaluated July 2, 1979.
[2]Dicamba + 2,4-D (Velsicol's Banvel 720 - 1 lb dicamba + 2 lb 2,4-D/gal).
[3]Dicamba + 2,4-D (Velsicol's Weedmaster - 1 lb dicamba + 3 lb 2,4-D/gal).

Effect of spring and fall applied herbicides on *Crupina vulgaris*; Idaho County, Idaho. Belles, W. S., D. W. Wattenbarger and G. A. Lee. *Crupina vulgaris*, common crupina, is an annual member of the Asteraceae or sunflower family, which has recently invaded Idaho, north of Grangeville. A native of the mediterranean region *C. vulgaris* poses a threat to our range lands. It now covers approximately 5,000 acres of grazing land along drainage ways of Idaho County. The plant is an erect annual up to 3 ft. tall. The leaves are alternate and generally deeply lobed, although the lower leaves are entire. The flowers are lavender to purple.

Experiments were established on adjacent rocky sites with nearly a solid stand of *C. vulgaris* on October 4, 1977 and March 27, 1978. Plants were in the rosette stage from 2 to 6 inches in diameter at both sites. Soil temperatures were 59 and 55 F at 4 inches, air temperatures 47 and 58 F, relative humidity 55 and 50% and wind velocity 0-2 and 3-5 mph., respectively, for the October and March treatment times. Non-granular herbicides were applied with a knapsack sprayer at 40 gpa with water as the carrier. Granules were applied by hand. Plot size was 9 by 30 ft. Each treatment was replicated three times in a randomized complete block design. Visual evaluations of percent control on the fall treatments were taken on October 24, 1977, January 6, 1978 and July 10, 1978. the March 1978 treatments were evaluated on July 10, 1978. Data was analyzed using Duncan's multiple range test. Visual evaluations of percent control for both treated dates was taken on October 10, 1979 to evaluate residual control.

Results of the October 4, 1977 treatments are in table 1. Twenty one days after the fall applications glyphosate at 2.0 and 6.0 lb ai/A (1.5 and 4.5 lb ae/A) gave complete common crupina control. Dicamba at 4.0 lb ai/A with 70% control was the only other treatment which resulted in a significant reduction compared to the untreated control. The winter of 1977-1978 was relatively mild with snow fall lasting for short periods prior to melting. By January 6, 1978 picloram at 1.0 lb ai/A, dicamba at 4.0 lb ai/A and the two glyphosate treatments had resulted in complete kill of all common crupina plants. Examination of roots of remaining plants in plots of all other treatments at this time revealed severe injury. The following summer on July 10, 1978 excellent control was obtained with all treatments. The 2,4-D amine treatments of 1.0 and 4.0 lb ai/A cause 97 and 99% control, respectively. All other treatments resulted in 100% control.

All herbicide treatments applied in the spring of 1978 significantly reduced common crupina stands compared to the control (Table 2). Complete (100%) control was obtained with eight treatments. These were glyphosate at 1.0 and 2.0 lb ai/A (.75 and 1.5 lb ae/A), dicamba at 1.0 and 2.0 lb ai/A, and picloram at .25 and .50 lb ai/A. The picloram 2% beads were more effective at this evaluation than either the newer formulated granules M4301 and M3864.

Significant reduction of common crupina compared to the check still occurred at the October 10, 1979 evaluations by all herbicide treatments. Over 90% stand reduction was accomplished by all but two treatments; picloram (2% beads) at .25 lb ai/A and picloram (5% pellets) at .50 lb ai/A. Continued control by short-lived herbicides (2,4-D and glyphosate) was probably accomplished because of low incidence of wind achene dispersal and a low dormancy (7%) of crupina achenes. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843.)

Table 1: Fall applied herbicides for the control of *Crupina vulgaris*

Treatment	Rate	Control			
		10/24/77	1/6/78	7/10/78	10/10/79
	(lb ai/A)	(%)			
Control	0	0d[2/]	0e	0c	0b
Glyphosate	2.0	100a	100a	100a	94a
Glyphosate	6.0	100a	100a	100a	98a
Dicamba	1.0	37c	92b	100a	97a
Dicamba	4.0	70b	100a	100a	100a
2,4-D (amine)	1.0	10cd	18d	97b	83a
2,4-D (amine)	4.0	30c	32c	99a	99a
Picloram (K salt)	0.25	33c	95ab	100a	98a
Picloram (K salt)	1.0	40c	100a	100a	99a

1/ Treatments applied October 4, 1977.

2/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Table 2: Spring applied herbicides for the control of <u>Crupina vulgaris</u>

Treatment	Rate	Control 7/10/78	Control 10/10/78
	(lb ai/A)	-------(%)--------	
Control	0	0d[2/]	0c
Glyphosate	1.0	100a	100a
Glyphosate	2.0	100a	100a
Dicamba	1.0	100a	99a
Dicamba	2.0	100a	98a
2,4-D (amine)	1.0	80a-c	100a
2,4-D (amine)	4.0	88a-c	100a
Picloram (K salt)	0.25	100a	100a
Picloram (K salt)	0.50	100a	100a
Picloram (K salt) + 2,4-D (amine)	0.125 + 1.0	100a	98a
Picloram (K salt) + 2,4-D (amine)	0.25 + 1.0	100a	100a
Picloram (2% beads)	0.25	79a-c	75b
Picloram (2% beads)	0.50	73bc	93a
Picloram (2% pellets)	0.25	98a	98a
Picloram (2% pellets)	0.50	94ab	99a
Picloram (5% pellets)	0.25	70c	94a
Picloram (5% pellets)	0.50	80a-c	83ab

1/ Treatments applied March 27, 1978

2/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Duncecap larkspur control with postemergence herbicides. Blank, S. E. In 1978, a cooperative herbicide testing program was undertaken with the U.S. Forest Service - Sawtooth National Forest - to evaluate postemergence herbicides for controlling duncecap larkspur on rangelands. Postemergence herbicide treatments were applied on July 26, 1978 to a uniform stand of duncecap larkspur at a full bloom stage of growth. Chemicals were applied utilizing a CO_2 pressurized backpack sprayer with a 6 ft boom calibrated to deliver 20 gpa. The 8 ft by 20 ft field plots were replicated three times in a randomized complete block design at each of two locations. The air temperature at herbicide application time was 87 F. All treatments were visually evaluated on August 25, 1978 and June 15, 1979 for percent weed control when compared to an untreated check plot. (Monsanto Agricultural Products Company, St. Louis, Missouri 63166)

The commercial formulation containing the isopropylamine salt of glyphosate (IPA glyphosate) provided superior control of duncecap larkspur. Based upon late July treatments at a full flowering stage of growth, 2.25 lb ae/A or more of IPA glyphosate was needed to achieve adequate control. A combination with additional surfactant did not influence IPA glyphosate efficacy on larkspur.

Duncecap larkspur control with postemergence herbicides applied in 1978

		Percent Control[1/]	
		Time of Evaluation	
Herbicide	Rate[2/] lb/A	August 1978	June 1979
IPA glyphosate	1.5	94	84
IPA glyphosate	2.25	92	89
IPA glyphosate	3.0	96	92
IPA glyphosate	3.75	96	95
IPA glyphosate	4.5	96	95
IPA glyphosate + X-77 surfactant	1.5+0.5%(v/v)	93	85
IPA glyphosate + X-77 surfactant	3.0+0.5%(v/v)	95	94
Dicamba	6.0	76	17
2,4-D amine + dicamba	3.0+1.0	70	7

1/ Values are averages of two separate locations, each containing three replications.

2/ IPA glyphosate rates expressed as lb ae/A; 2,4-D amine and dicamba rates expressed as lb ai/A.

Evaluation of herbicides for plains pricklypear control. Alley, H. P., T. K. Schwartz and N. E. Humburg. Pricklypear control plots were established on a badly depleted rangeland with a moderate infestation of pricklypear and a dense enough infestation of broom snakeweed to obtain control evaluations on this species also. Pricklypear was in the past bloom stage of growth and broom snakeweed in full bloom at time of treatment. All treatments were applied by knapsack in a total volume of 40 gpa water carrier.

Control evaluations were made on July 16, 1978 and July 17, 1979, one and two years following treatment. Picloram applied alone and the combination of picloram/2,4,5-T were the only effective treatments. Picloram at 0.25 and 0.5 lb ai/A gave 92 and 98% control, respectively, of plains pricklypear. The mixture of picloram/2,4,5-T at 0.5 lb ai/A of each was no more effective than picloram alone at an equivalent rate. Picloram at 0.5 lb ai/A and picloram/2,4,5,-T at 0.5 lb ai/A each gave 50 and 75% control of broom snakeweed, respectively. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 979).

Plains pricklypear and broom snakeweed control

Herbicide[1]	Rate lb ai/A	Percent control	
		Pricklypear	Snakeweed
dichlorprop	2.0	35	0
dichlorprop	3.0	60	0
dichlorprop + 2,4-D[2]	1.0 + 1.0	25	0
dichlorprop + 2,4-D	1.5 + 1.5	25	0
silvex	1.0	35	0
silvex	2.0	65	0
picloram	0.25	92	0
picloram	0.5	98	50
picloram + 2,4,5-T	0.5 + 0.5	95	75

[1]Treatments applied July 26, 1977; evaluated July 17, 1979.
[2]Mixture--2 lb ai/gal each of propionic and phenoxyacetic acid.

Effect of sub-lethal hormone herbicide dosages on rush skeletonweed seed viability. Cheney, T. M., G. A. Lee, and W. S. Belles. A study was established to determine the effect of selected hormone herbicides on rush skeletonweed seed viability at Garden Valley, Idaho. Plots were sprayed July 25, 1978. Herbicides were applied postemergence with a knapsack sprayer equipped with a three nozzle boom, calibrated to deliver 10 gpa. Rush skeletonweed plants were 3-to 4-feet tall and in the bud and early flower stage of growth. Individual plots were 9 by 20 ft and treatments were replicated three times in a randomized complete block design. Soil surface was smooth with little forest debris. Sky conditions were clear at the time of application. Air temperature and relative humidity were 85 F and 68%, respectively. No wind was present at the time of application. Soil temperature at 6 inches was 94 F. Extremely dry conditions prevailed throughout late spring and early summer. Percent germination of rush skeletonweed seed was determined by visual observations and germination counts in the greenhouse.

Germination of seeds from plants treated with dicamba at .25 lb/A and 2,4-D + dicamba at .125 lb/A was 7.3% compared to 94.0% seed germination in the non-treated check plots. Picloram at .125 lb/A and 2,4-D + picloram at all rates resulted in 80.8% or better reduction in seed viability compared to seed collected from non-treated plants. 2,4-D(LVE) at .125 and .25 lb/A had the least influence on the percentage germination of rush skeletonweed. The results of this study indicates that sub-lethal dosages of dicamba, dicamba + 2,4-D, picloram and picloram + 2,4-D can be utilized to impair the production of rush skeletonweed seed, and thus, reduce the rapid spread of infestations. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Influence of hormone herbicides on the
percent germination of rush skeletonweed seed

Treatment	Rate lb/Acre	% Germination	% Reduction in Germination
2,4-D(LVE)	.125	67.6	28.1
2,4-D(LVE)	.25	86.3	8.0
dicamba	.0625	51.0	45.7
dicamba	.125	29.3	68.8
dicamba	.25	7.3	92.2
2,4-D + dicamba	.125+.0625	32.3	65.6
2,4-D + dicamba	.125+.125	17.6	81.d
2,4-D + dicamba	.25+.0625	34.3	63.5
2,4-D + dicamba	.25+.125	7.3	92.2
picloram	.0625	21.6	77.0
picloram	.125	9.3	90.1
2,4-D + picloram	.125+.0625	15.3	83.7
2,4-D + picloram	.125+.125	13.0	86.2
2,4-D + picloram	.25+.0625	18.0	80.8
2,4-D + picloram	.25+.125	11.6	87.7
check	--	94.0	-

Effect of herbicides on control and seed production of Scotch thistle; Washington County, Idaho. Belles, W. S., D. W. Wattenbarger and G. A. Lee. Scotch thistle is a biennial or short-lived perennial which may invade pastures, small grain and alfalfa fields and rangelands. The plants may be very large (up to 9 feet tall and 5 feet across) and are heavy seed producers (up to 30,000 per plant).

Herbicide treatments were applied to a vigorous stand of Scotch thistle rosettes on rangeland on April 18, 1978. The rosettes were from 2 in. to 20 in. in diameter with an average of 16 plants per square foot. The liquid treatments were applied with a knapsack sprayer at 40 gpa. Dry compounds were mixed with soil and applied by hand.

Visual evaluations were made 4 months after application and thistle control ranged from a low of 10% to 100% control. A 97% or better control of Scotch thistle was obtained by all rates of 2% picloram beads, 1.0 lb ai/A of 5% picloram pellets, .50 and 1.0 lb ai/A of picloram and all rates of picloram plus 2,4-D.

Seed production was eliminated or reduced by all herbicide treatments used. With the exception of 2,4-D amine alone and .25 and .50 lb ai/A of 5% picloram pellets, all treatments significantly reduced seed production of Scotch thistle by 90% or more.

Visual evaluations were also made April 26, 1979 to evaluate Scotch thistle control. Only compounds containing picloram (both liquid and granular) resulted in acceptable control twelve months after application. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843)

Herbicide control of scotch thistle, Washington County, Idaho

Treatment[1]	Rate	Seed Reduction 8/17/78	Control[2] 8/17/78	4/26/79
	(lb ai/A)	------%-------	--------%---------	
Control		0e	0g[3]	0[4]
Picloram (2% pellets)	0.25	98a	65bc	90
Picloram (2% pellets)	0.50	93a	85ab	94
Picloram (2% pellets)	1.0	99a	87ab	93
Picloram (2% beads)	0.25	100a	99a	99
Picloram (2% beads)	0.50	100a	99a	98
Picloram (2% beads)	1.0	100a	100a	100
Picloram (5% pellets)	0.25	13d	10fg	63
Picloram (5% pellets)	0.50	65c	47de	88
Picloram (5% pellets)	1.0	100a	97a	97
Picloram (K salt)	0.25	100a	81a-c	94
Picloram (K salt)	0.50	100a	99a	99
Picloram (K salt)	1.0	100a	100a	98
Picloram (K salt) + 2,4-D (amine)	0.125 + 0.25	100a	98a	87
Picloram (K salt + 2,4-D (amine)	0.25 + 0.50	100a	98a	88
Picloram (K salt) + 2,4-D (amine)	0.50 + 1.0	100a	99a	96
2,4-D (amine)	1.0	83b	57b-d	13
2,4-D (amine)	2.0	80b	13fg	10
Dichlorprop	1.0	99a	23e-g	13
Dichlorprop	2.0	99b	13fg	12
Dicamba	2.0	100a	47de	10
Dicamba	4.0	100a	37d-f	7
Dicamba + 2,4-D (amine)	0.50 + 1.5	100a	52c-e	12
Dicamba + 2,4-D (amine)	1.0 + 3.0	100a	59b-d	18

1 Treatments applied April 18, 1978

2 Visual evaluations are averages of three replications

3 Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

4 Statistical analysis not completed

Spotted knapweed control on non-cropland. Belles, W. S., D. W. Wattenbarger and G. A. Lee. Herbicide treatments were established on non-cropland situated between a county road and a railroad track in Kootenai County. All treatments were applied on May 25, 1977. Knapweed plants were in the rosette stage from 4 to 8 inches in diameter except for two glyphosate treatments which were applied on July 25, 1977, when the spotted knapweed was in the late bloom stage. Plots were 9 by 30 ft. with treatments replicated three times in a randomized complete block design. All liquid applications were made with a knapsack sprayer at 40 gpa with water as the carrier. Picloram granules were applied by hand. Stand counts were made on October 26, 1977, and visual evaluations of percent knapweed control on May 19, 1978. Knapweed populations average 19 plants/sq. ft. on October 26 and 11 plants/ sq. ft. on May 19.

Rainfall totaled 9.8 in. between herbicide treatments in May and the October evaluation. This could be the reason for the relatively poor performance of the picloram granular materials. Treatments which did not significantly reduce spotted knapweed populations compared to the control were picloram 5% granules at .25 and .5 lb ai/A, and bentazon at 1.0 and 2.0 lb ai/A. Satisfactory control of 80% or greater was obtained with 2,4-D at 1.0 lb ai/A, dichlorprop at 2.0 lb ai/A, buthidazole at 4.0, 8.0 and 16.0 lb ai/A, picloram at .25 and .5 lb ai/A and picloram plus 2,4-D at .125 plus .25 and .25 plus .50 lb ai/A. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843)

Percent control of spotted knapweed in Kootenai County

Herbicide	Rate lb ai/A	Control[1/] 10/26/77 %	Control[1/] 5/19/78 %
Untreated	0	0d	0h
Picloram (2% granules)	.25	47bc	43c-f
Picloram (2% granules)	.50	48bc	32d-h
Picloram (5% granules)	.25	33cd	13f-h
Picloram (5% granules)	.50	30cd	40c-g
Picloram (K salt)	.25	93ab	70a-d
Picloram (K salt)	.50	100a	95a
Picloram + 2,4-D (amine)	.125 + .25	98a	85ab
Picloram + 2,4-D (amine)	.25 + .50	100a	94a
2,4-D (LV ester)	1.0	84ab	30e-h
Dichlorprop	1.0	45bc	15f-h
Dichlorprop	2.0	87ab	38c-h
Bentazon	1.0	21cd	3gh
Bentazon	2.0	25cd	3gh
Buthidazole	4.0	89ab	52b-f
Buthidazole	8.0	100a	76a-c
Buthidazole	16.0	100a	83ab
Glyphosate rosette	2.0	48bc	58a-e
Glyphosate rosette	4.0	56abc	65a-e
Glyphosate late bloom	2.0	65abc	17f-h
Glyphosate late bloom	4.0	51bc	45c-f
Dicamba + 2,4-D (amine)	.5 + 1.5	100a	91a
Dicamba + 2,4-D (amine)	1.0 + 3.0	100a	93a

1/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Effects of various herbicide treatments and subsequent fertilization on spotted knapweed control and forage production in Bonner County. Belles, W. S., D. W. Wattenbarger and G. A. Lee. Spotted knapweed is a biennial herb or short-lived perennial that presents problems in sandy pastures, old fields, gravelly roadsides and on rangelands in the Idaho panhandle. Field trials were initiated in Bonner County on June 14, 1977, to evaluate performance of various herbicides on control of spotted knapweed and effects of a fertilizer application one year after the herbicide treatment. Herbicide treatments were applied with a knapsack sprayer equipped with a three-nozzle boom. Applications were made with a water carrier at a rate of 40 gpa. Plots were 9 by 30 ft. Treatments were replicated three times in a randomized complete block design. One-half of each plot was given a top dressing of 40 lb N/A as ammonium sulfate on May 31, 1978.

Percentage control taken in 1977 was obtained by counting living plants in a 2.5 sq. ft. quadrat at two random locations in each plot. Visual evaluations were made May 19, 1978. An area approximately 3 by 24 feet was harvested from each plot on July 24, 1978. Spotted knapweed and forage were separated, dried and weighed to determine dry matter production. In 1979, visual evaluations were again taken to determine knapweed control.

Percent control data are in Table 1. Stand counts were taken in October, four months after herbicides were applied. These showed that eight treatments significantly reduced spotted knapweed plant numbers. They were picloram at .25 and .5 lb ai/A, picloram plus 2,4-D at .125 plus .25 and .25 plus .5 lb ai/A, buthidazole at 4.0 and 8.0 lb ai/A, and dicamba plus 2,4-D at 0.5 plus 1.5 and 1.0 plus 3.0 lb ai/A. Control with these treatments ranged from 86 to 100%. The following year on May 19, 1978, visual evaluations showed increased effectiveness of most compounds. All but six treatments significantly reduced spotted knapweed. Those were the two bentazon rates, both asulam rates and both glyphosate late bloom treatments. Control of 80 to 99% resulted from the following treatments: picloram (2% granules), picloram (K-salt) at .25 and .5 lb ai/A, picloram plus 2,4-D at .125 and .25 and .25 and .5 lb ai/A and buthidazole at 8.0 lb ai/A. The dicamba plus 2,4-D combinations were less effective than the previous October, while picloram 2% and 5% granules and the early glyphosate treatments were more effective than the 5% picloram beads earlier evaluation.

Dry matter production is in Table 2. Fertilizer applications in general increased production of both spotted knapweed and forage. Where spotted knapweed was not well controlled, there was some indication that spotted knapweed outcompeted forage species for the added nitrogen. This is evident with the control where only spotted knapweed production increased with added N. There was no consistent interaction between fertilization and herbicide treatments. Forage production was significantly increased on nonfertilized plots by five treatments; picloram plus 2,4-D at .25 plus .5 lb ai/A, both dicamba-2,4-D combinations, and both early glyphosate applications. Only three treatments resulted in significant forage increases on the fertilized plots. The dominant forage species were Canada bluegrass, quackgrass and hairy vetch. Hairy vetch was the dominant forage component on all plots except those treated with picloram.

Visual evaluations of spotted knapweed control were taken on June 12, 1979. Picloram treatments resulted in the best residual control. Picloram (2% beads and K-salt) at .25 and .50 lb ai/A and Picloram plus 2,4-D at .25 plus .50 lb all produced better than 90% control. Picloram (5% pellets) however did not provide acceptable control at rates tested. Buthidazole and dicamba plus 2,4-D at the rates tested were similar in residual spotted knapweed control resulting in 75% control or less. Glyphosate at 1.0 and 2.0 lb ai/a applied to spotted knapweed in the rosette to bolting stage resulted in 48 to 36% control. The same treatments applied at the late bloom stage resulted in virtually no control. Bentazon and asulam were ineffective in controlling spotted knapweed at the rates tested. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Table 1. Spotted knapweed control, Bonner County

Herbicide[1/]	Rate	Control 10/26/77[2/]	Control 5/19/78[3/]	Control 6/12/79
	(lb ai/A)	---------------	%	---------------
Untreated Control	0	0b[4/]	0f	0
Picloram, 2% gran	0.25	27b	75bcd	91
Picloram, 2% gran	0.50	28b	81abc	92
Picloram, 5% gran	0.25	32b	40e	20
Picloram, 5% gran	0.50	26b	57de	47
Picloram K salt	0.25	98a	93ab	94
Picloram K salt	0.50	100a	99a	100
Picloram + 2,4-D	0.125 + 0.25	100a	80abc	89
Picloram + 2,4-D	0.25 + 0.50	98a	97a	99
Bentazon	1.0	12b	7f	0
Bentazon	2.0	26b	0f	2
Buthidazole	4.0	86a	57de	57
Buthidazole	8.0	96a	98a	75
Asulam	2.0	19b	2f	0
Asulam	3.0	14b	5f	0
Dicamba + 2,4-D	0.5 + 1.5	100a	72cd	59
Dicamba + 2,4-D	1.0 + 3.0	100a	75bcd	73
Glyphosate 5 leaf to	1.0	27b	62cd	48
Glyphosate early bolting	2.0	25b	68cd	36
Glyphosate Late Bloom	1.0	28b	10f	2
Glyphosate	2.0	17b	0f	0

1/ Applied June 14, 1977, except glyphosate late bloom treatments which were applied July 25.

2/ Stand counts control averaged 10 plants/sq ft.

3/ Visual evaluations are averages of three replications.

4/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Table 2. Spotted knapweed and forage production after herbicide and fertilizer applications. Bonner County, Idaho.

Herbicide 1/	Rate	Dry Matter Production			
		Spotted Knapweed		Forage	
		Non-Fertilized	Fertilized	Non-Fertilized	Fertilized
	(lb ai/A)	(lb ai/A)		(lb/A)	
Untreated Control	0	3420ab 3/	5160a	180f	180de
Picloram, 2% gran	0.25	1530b-f	1840bc	450def	800b-d
Picloram, 2% gran	0.50	950ef	1190c	670def	930b-e
Picloram, 5% gran	0.25	1910b-f	3600ab	340ef	220cde
Picloram, 5% gran	0.50	1790b-f	2240bc	600def	440cde
Picloram	0.25	560ef	200c	600def	850b-e
Picloram	0.50	0f	0c	700def	910b-e
Picloram + 2,4-D	0.125 + 0.25	1030def	830c	880c-f	920b-e
Picloram + 2,4-D	0.25 + 0.50	1400b-f	370c	1350bcd	1160abc
Bentazon	1.0	3210a-d	4920a	150f	1600abc
Bentazon	2.0	0f	0c	0f	0e
Asulam	2.0	4190a	4320a	400ef	350cde
Asulam	3.0	2650a-e	4320a	540def	220de
Dicamba + 2,4-D	0.5 + 1.5	1040ef	480c	2280a	2510a
Dicamba + 2,4-D	1.0 + 3.0	130f	170c	1760ab	1490a-d
Glyphosate	1.0	320f	380c	1210b-e	1480a-d
Glyphosate	2.0	1140c-f	450c	2160abc	1930ab
Glyphosate	1.0	1750b-f	3630ab	470def	770b-e
Glyphosate	2.0	1790b-f	4140ab	400ef	1410a-e

1/ Applied June 14, 1977, except glyphosate late bloom treatments which were applied July 25.
2/ Applied July 25, 1977.
3/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Spotted knapweed control and forage yields one year after herbicide treatments. Wattenbarger, D. W., W. S. Belles and G. A. Lee. Herbicide treatments were applied on May 17, 1978 to a solid stand (21 to 42 plants per sq. ft.) of spotted knapweed in an abandoned pasture. Treated plants were in the rosette stage of growth. Plot size was 9 by 30 feet, with three replications arranged in a randomized complete block design. Dry materials were distributed by hand, and liquid formulations were applied with a knapsack sprayer calibrated to deliver a total volume of 40 gpa water carrier.

Visual evaluations on percent control of spotted knapweed were taken on June 12, 1979. On July 9, 1978 a 3 by 10 foot quadrat was randomly placed in each treatment and all plant material within the area was harvested. Knapweed and desirable forage was separated, air dried and weights recorded for each component.

Spotted knapweed control 13 months after application was variable and ranged from 13 to 100 percent. Liquid formulations of picloram more effectively controlled spotted knapweed than comparable rates of picloram granular materials. Control of 90 to 100 percent was achieved by the following treatments; picloram (2% beads) at 1.0 lb ai/A, picloram (K-salt) at all rates, picloram plus 2,4-D at 0.25 plus 0.5 lb ai/A, respectively, dicamba at 1.0 and 2.0 lb ai/A, and dicamba plus 2,4-D at 1.0 plus 3.0 lb ai/A, respectively. Visual evaluations of treatments yielding 80 to 92 percent control of spotted knapweed was accomplished with picloram (2 and 5% pellets) at 1.0 lb ai/A, picloram (2% beads) at 1.0 lb ai/A, 2,4-D (amine) at 1.0 and 2.0 lb ai/A and dicamba plus 2,4-D at 0.5 plus 1.5 lb ai/A, respectively.

Total dry weight of knapweed was appreciably decreased by all treatments except dichlorprop. No knapweed was harvested from the following treatments; all rates of picloram (K-salt), the two higher rates of picloram plus 2,4-D and the 1.0 lb ai/A rate of dicamba.

Forage yields were increased by a factor of three to twelve times by all treatments when compared to the untreated control. Maximum forage increases were realized by the lighter rates of picloram (K-salt), the two heavier rates of picloram plus 2,4-D and both treatments of dicamba in combination with 2,4-D. The least increase in forage yield resulted from the dichlorprop formulations. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Spotted knapweed control and forage yields
one year after herbicide treatments

Treatment[1/]	Rate	Plant Dry Weights: Spotted knapweed	Plant Dry Weights: Forage	Control
	(lb ai/A)	(lb/A)	(lb/A)	%
Control	0	1394	112	0
Picloram (2% pellets)	0.25	604	565	13
Picloram (2% pellets)	0.50	444	742	62
Picloram (2% pellets)	1.0	499	598	86
Picloram (2% beads)	0.25	422	652	65
Picloram (2% beads)	0.50	326	902	89
Picloram (2% beads)	1.0	19	899	96
Picloram (5% pellets)	0.25	1097	508	26
Picloram (5% pellets)	0.50	32	771	68
Picloram (5% pellets)	1.0	9	1151	88
Picloram (K-salt)	0.25	0	1023	99
Picloram (K-salt)	0.50	0	1036	100
Picloram (K-salt)	1.0	0	969	100
Picloram (K-salt) + 2,4-D (amine)	0.65 + 0.375	301	828	75
Picloram (K-salt) + 2,4-D (amine)	0.375 + 0.25	0	1173	96
Picloram (K-salt) + 2,4-D (amine)	0.25 + 0.50	0	1247	100
2,4-D (amine)	1.0	339	793	85
2,4-D (amine)	2.0	131	988	81
Dichlorprop	1.0	1359	329	13
Dichlorprop	2.0	1330	499	37
Dicamba	1.0	0	751	99
Dicamba	2.0	45	876	98
Dicamba + 2,4-D (amine)	0.50 + 1.5	32	1081	92
Dicamba + 2,4-D (amine)	1.0 + 3.0	121	1129	99

[1/] Treatments applied May 18, 1978

Effect of herbicides on the control of spotted knapweed in rangelands. Wattenbarger, D. W., W. S. Belles and G. A. Lee. Plots were established in Lemhi County, Idaho on April 20, 1978. Spotted knapweed rosettes were from 1 to 8 inches in diameter with an average population of 148 plants per square foot. The 9 by 30 ft. plots were arranged in a randomized complete block design with treatments replicated three times. Dry materials were applied by hand and liquid materials were applied with a knapsack sprayer at 40 gpa. Visual evaluations of spotted knapweed control and grass injury were made on September 21, 1978 and June 27, 1979. Injury ratings of grass were determined by a visual evaluation of stand and vigor reduction combined. The grasses were predominantly perennial bluegrasses in the early stage of growth (leaves 3-4" long) and annual grasses.

In 1978, all liquid compounds containing picloram or dicamba resulted in a 99% or better control of spotted knapweed. Picloram 2% beads at .5 and 1.0 lb ai/A and 2,4-D amine at 2.0 ai/A resulted in 93% or better control. Picloram pellets resulted in less control than beads or liquid formulations of picloram at five months after application. Dichlorprop resulted in less control of knapweed than other liquid compounds at comparable rates.

Dicamba resulted in the greatest grass injury with over 70% at 2 and 4 lb ai/A. Dicamba plus 2,4-D at .5 and 1.5 lb ai/A and picloram 2% pellets were the only other compounds to result in a 50% or greater injury to grass.

Visual evaluations of spotted knapweed control were taken again on June 27, 1979. Picloram (2% beads) at .25 lb ai/A resulted in 95% control and gave better control than picloram (2% or 5% pellets) at the .50 lb ai/A rate. All dry picloram compounds at the 1.0 ai/A rate resulted in 99% or better control of knapweed. Picloram (K-salt) at a minimum rate of .25 lb ai/A resulted in 100% knapweed control in all combinations of picloram plus 2,4-D. Dicamba at 2.0 lb ai/A and dicamba plus 2,4-D at 1.0 plus 3.0 lb ai/A, respectively, also resulted in 100% control of spotted knapweed. Dichlorprop and 2,4-D did not result in greater than 60% control fourteen months after application.

Forage response was visually evaluated fourteen months after treatment as percent ground cover. Only six treatments resulted in 85% or greater ground cover: picloram (2% pellets) at 1.0 lb ai/A, picloram (K-salt) at .25 and 50 lb ai/A and all rates of picloram plus 2,4-D. All other treatments had approximately the same percent ground cover as the untreated control except dichlorprop and dicamba which resulted in less ground cover than the control. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843)

Control of spotted knapweed with herbicides

Treatment	Rate	Control 9/21/78	Control 6/27/79	Injury 9/21/78	Grass Cover 6/27/79
	(lb ai/A)	---------%---------		%	%
control	0	0	0	0	68
picloram 2% pellets (M4301)	0.25	27	60	27	77
picloram 2% pellets (M4301)	0.50	48	80	37	73
picloram 2% pellets (M4301)	1.0	86	99	55	97
picloram 2% beads	0.25	67	95	17	70
picloram 2% beads	0.50	95	100	27	72
picloram 2% beads	1.0	93	100	47	70
picloram 5% pellets (M3864)	0.25	30	50	27	67
picloram 5% pellets (M3864)	0.50	53	70	37	73
picloram 5% pellets (M3864)	1.0	82	100	33	63
picloram (K salt)	0.25	100	100	17	87
picloram (K salt)	0.50	100	100	20	93
picloram (K salt)	1.0	100	100	35	77
picloram (K salt) + 2,4-D (amine)	.125 + .25	99	100	20	85
picloram (K salt) + 2,4-D (amine)	.25 + .50	100	100	17	88
picloram (K salt) + 2,4-D (amine)	.50 + 1.0	100	100	40	88
2,4-D (amine)	1.0	78	30	7	75
2,4-D (amine)	2.0	98	60	10	72
dichlorprop	1.0	67	50	3	55
dichlorprop	2.0	87	10	27	43
dicamba	2.0	100	100	73	55
dicamba	4.0	100	70	77	40
dicamba + 2,4-D (amine)	.5 + 1.5	99	95	50	70
dicamba + 2,4-D (amine)	1.0 + 3.0	100	100	33	73

Evaluation of chemicals for control of spreading wild buckwheat (*Eriogonum effusum*). Alley, H. P., T. K. Schwartz and N. E. Humburg. Spreading buckwheat is becoming an increasingly important component of the rangeland in southeastern Wyoming. The plant is not utilized by domestic or game animals and seems to be increasing in the acreage of rangeland infested and in such density that it makes up over 50% of the vegetation.

At time of treatment, June 3, 1977, spreading buckwheat was near full leaf development and somewhat stunted by extreme drought conditions. Liquid formulations were applied with a knapsack unit in a total volume of 20 gpa water carrier. Plots were evaluated June 30, 1978 and August 10, 1979, approximately one and two years following treatment.

The treatments of picloram/2,4-D at 0.25 + 0.5 lb ai/A, 2,4,5-T at 2.0 lb ai/A, dicamba/2,4-D at 1.0 + 2.0 lb ai/A, and dicamba pellet at 2.0 lb ai/A appeared to be the most effective treatments which did not cause serious grass damage. Dicamba at 4.0 lb ai/A gave outstanding control but was damaging to the grass and would be an expensive treatment for the low productive range sites where spreading wild buckwheat is common. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR 974).

Herbicides and spreading wild buckwheat control

Herbicide[1]	Rate lb ai/A	Percent control 1978	1979	Observations
dicamba XP 10%	2.0	95	80	Grass okay
dicamba XP 10%	4.0	100	90	" "
dicamba 5G	2.0	90	50	" "
dicamba 5G	4.0	100	60	" "
dicamba 4L	2.0	50	40	" "
dicamba 4L	4.0	100	95	Grass hurt
buthidazole 5G	2.0	50	60	70% grass reduction
buthidazole 5G	4.0	100	100	Bare ground
buthidazole 75W	2.0	50	100	50% grass reduction
buthidazole 75W	4.0	80	100	Bare ground
dicamba/2,4-D	1.0 + 2.0	20	80	Grass okay
dicamba/2,4-D	2.0 + 4.0	60	80	Grass hurt
2,4-D amine	1.0	0	0	Grass okay
2,4-D amine	2.0	20	0	" "
2,4-D LVE	1.0	0	20	" "
2,4-D LVE	2.0	20	40	" "
2,4,5-T E	1.0	0	30	" "
2,4,5-T E	2.0	50	80	" "
silvex	1.0	0	0	" "
silvex	2.0	0	50	" "
picloram/2,4-D	0.25 + 0.5	50	80	" "
picloram/2,4-D	0.5 + 1.0	60	80	" "
picloarm	0.25	50	30	" "
picloram	0.5	50	70	" "
picloram/2,4,5-T	0.25 + 0.25	50	40	" "
picloram/2,4,5-T	0.5 + 0.5	80	70	" "
Dowco 290	0.25	0	20	Grass okay
Dowco 290	0.5	50	50	" "

[1]Treated June 3, 1977; evaluated June 30, 1978 and August 10, 1979.

Control of yellow starthistle on dryland pasture. McHenry, W.B., N.L. Smith and C.B. Wilson. Yellow starthistle is a troublesome weed that infests rangelands of California. It is poisonous to horses and its sharp spiny seedhead may cause mechanical injury to other livestock.

In the spring of 1978 a site was selected on the University of California Sierra Foothill Range Station to compare several herbicides for effective control of starthistle. A split plot design was utilized with an early application made February 15 when starthistle was 2 to 6 cm tall and in the 5 leaf stage. Starthistle was 12 to 15 cm tall when the second application was made to adjacent plots on March 13. Herbicides were applied utilizing a 20 GPA spray volume to 10 ft. by 20 ft. plots replicated four times. A surfactant (X-77) at 0.5% v/v was included with 2,4-D amine, dicamba and picloram. An additional treatment consisted of applying nitrogen at the rate of 65 lb. N/Acre (as ammonium sulfate) to determine the influence of increased vigor and growth on starthistle. Starthistle plant counts, see Table 1, indicated that excellent control could be achieved with picloram and dicamba applied at both growth stages and with the higher rates of 2,4-D applied at the younger stage. The population of starthistle was extensively reduced by the application of nitrogen.

For 1979 the experiment was essentially repeated utilizing lower rates of dicamba and picloram in a single application on March 5, 1979. Method of application was the same as 1979 and starthistle was in the 4 to 6 leaf rosette stage, 2 to 6 cm in diameter. The plot area had been mowed and raked of old weed growth prior to seeding November 12, 1978 to subterranean and rose clover. On may 25 samples were mowed from one rate of each compound. These were hand sorted to determine composition of each from 0.75 lb. 2,4-D (amine and ester) 0.125 lb. dicamba and 0.63 lb. ai/A of picloram. (University of California Cooperative Extension, Davis, CA 95616 and Yuba City, CA 95991)

Table 1: Yellow starthistle control 1978

			% Composition (dry weight)			Plant counts[1/]
Herbicide	ai/A	Timing	Grasses	Broad-leaves	Yellow starthistle	starthistle
2,4-D w.s.a.	0.25 lb	Early				3.5
		Late				11.8
2,4-D w.s.a.	0.5	E				0.4
		L				9.5
2,4-D w.s.a.	0.75	E	99.8	0.2	0	0.1
		L	95.6	4.4	0	10.2
2,4-D w.s.a.	1.0	L	95.6	4.4	0	1.8
2,4-D l.v.e.	0.25	E				2.1
		L				7.3
2,4-D l.v.e.	0.5	E				1.2
		L				6.6
2,4-D l.v.e.	0.75	E	99.4	0.6	0	0.2
		L	97.2	2.7	0.1	1.6
2,4-D l.v.e.	1.0	L	92.8	6.0	1.2	0.1
dicamba	0.25	E	84.9	15.1	0	0.1
		L	76.2	23.5	0	0.1
dicamba	0.5	E				0
		L				0.1
dicamba	0.75	E	92.5	4.1	0	0
		L	94.4	5.5	0	0
picloram	.063	E	98.2	1.8	0	0
		L	91.1	8.6	0	1.3
picloram	0.125	E	85.1	14.9	0	0
		L	95.0	5.0	0	0
picloram	0.25	E				0
		L				0
bromoxynil	0.25	E				15.2
		L				10.6
bromoxynil	0.5	E	91.5	4.9	3.6	9.4
		L	95.8	4.1	0.1	3.6
bromoxynil	0.75	E				6.9
		L				4.7
nitrogen	65 lb.	E	84.5	6.5	7.9	2.4
control	-	-	70.1	21.1	8.8	14.9

1/ plants per 10^{-4} acre.

Table 2: Yellow starthistle control 1978

Herbicide	Ai/A	Timing	Plant counts[1/]	Ranked means[2/]						
picloram	0.125	L	0	A						
dicamba	0.75	L	0	A						
picloram	0.25	E	0	A						
dicamba	0.75	E	0	A						
picloram	0.25	L	0	A						
picloram	0.63	E	0	A						
dicamba	0.5	E	0	A						
picloram	0.125	E	0	A						
dicamba	0.25	L	0.1	A						
dicamba	0.5	L	0.1	A						
2,4-D amine	0.75	E	0.1	A						
dicamba	0.25	E	0.1	A						
2,4-D ester	0.75	E	0.2	A						
2,4-D amine	0.5	E	0.4	A						
2,4-D ester	0.5	E	1.2	A	B					
picloram	0.63	L	1.3	A	B					
2,4-D ester	0.75	L	1.6	A	B					
2,4-D ester	0.25	E	2.1	A	B					
nitrogen	6.0	E	2.4	A	B					
2,4-D amine	0.25	E	3.5	A	B	C				
bromoxynil	0.5	L	3.6	A	B	C				
bromoxynil	0.75	L	4.7			C				
2,4-D ester	0.5	L	6.6			C	D			
bromoxynil	0.75	E	6.9			C	D	E		
2,4-D ester	0.25	L	7.3			C	D	E		
bromoxynil	0.5	E	9.4				D	E	F	
2,4-D amine	0.5	L	9.5				D	E	F	
2,4-D amine	0.75	L	10.2				D	E	F	
bromoxynil	0.25	L	10.6					E	F	
2,4-D amine	0.25	L	11.8						F	G
bromoxynil	0.25	E	15.2							G

1/ plants per 10^{-4} acre

2/ figures within a column followed by the same letter are not significantly different at the 5% level

Herbicide control of yellow starthistle on rangeland in Idaho. Wattenbarger, D. W., W. S. Belles and G. A. Lee. An experiment was designed and initiated to compare various herbicides to picloram on the control of yellow starthistle. Herbicides were applied to rangeland infested with yellow starthistle in May, 1979. Populations in the rosette stage of growth varied from 70 to over 100 starthistle plants per sq. ft. Plots were 9 by 30 feet arranged in a randomized complete block design with three replications. Liquid herbicides were applied with a knapsack sprayer at 20 gpa total volume with water as a carrier and dry herbicides were mixed with soil and applied by hand. Visual evaluations of starthistle control were made October 10, 1979.

Five months after treatment, 6 of the 13 treatments resulted in 100% control of yellow starthistle; picloram (K-salt) at .50 lb ai/A, dicamba at 1.0 and 2.0 lb ai/A, dicamba at 1.0 lb ai/A plus 5% surfactant and dicamba plus 2,4-D at 1.0 and 2.0 lb ai/A, with and without surfactant. Picloram (K-salt) at .25 lb ai/A and banvel 5% granules at 8.0 lb ai/A were the only other treatments to result in better than 95% control. (Idaho Agriculture Experiment Station, Moscow, ID 83843)

Yellow starthistle control on Idaho rangelands

Treatment[1/]	Rate	Control 10/10/79
	(lb ai/A)	-(%)-
Control	0	0
Picloram (K salt)	.25	97
Picloram (K salt)	.50	100
Dicamba	1.0	100
Dicamba	2.0	100
2,4-D (acid)[2/]	2.0	58
2,4-D (diamine)[3/]	2.0	57
Dicamba (5% gran)	2.0	53
Dicamba (5% gran)	4.0	75
Dicamba (5% gran)	8.0	96
Dicamba + X-77	1.0 + 5.0% v/v	100
Dicamba + X-77	2.0 + 5.0% v/v	78
Dicamba + 2,4-D (amine)	1.0 + 2.0	100
Dicamba + 2,4-D (amine + X-77	1.0 + 2.0 + 5.0% v/v	100

1/ Treatments applied 5/15/79

2/ Envy 2,4-D by Chas Lilly Co.

3/ Dacamine 2,4-D by Diamond Shamrock Corp.

Herbicide control of yellow starthistle on rangelands in Nez Perce County, Idaho. Wattenbarger, D. W., W. S. Belles, and G. A. Lee. Spring applications of dry and liquid herbicides were applied to a stand of yellow starthistle on April 12, 1978. The seedlings were in the rosette stage with a population of over 400 plants per square ft. The 9 by 30 foot plots were treated with a knapsack sprayer at 40 gpa for liquids while granular formulations were applied by hand. Plots were replicated three times in a randomized complete block design. The plots were harvested for yield determinations in mid July. Visual evaluations of percent control were taken one month after application on May 18, 1978 and again eighteen months after treatment on October 10, 1979.

A control of 85% or better of the yellow starthistle was effected with nine of the eighteen treatments one month after application. These were picloram at .25 and .50 lb ai/A, picloram plus 2,4-D at .125 + .25 and .25 + .50 lb ai/A, picloram, 2% beads at .50 lb ai/A, dicamba at 1.0 and 2.0 lb ai/A, and the dicamba + 2,4-D combinations of .50 + 1.5 and 1.0 + 3.0 lb ai/A. Picloram in the dry form was not as effective as the liquid, possibly due to inadequate moisture needed to activate the pellets. The 2% beads were more effective than the newer pelleted formulation M4301. Ineffective control was realized with dichlorprop and 2,4-D amine.

The principle forage grass species was downy brome with other annual and perennial grasses present. Yield data from plots where 85% or better yellow starthistle control occurred was obtained by harvesting, separating grass from yellow starthistle, and weighing the dried components. Data from the picloram 2% beads at .50 lb ai/A was lost. Grass yields were increased up to 200% of the check with some treatments. Total yield of grass plus yellow starthistle was reduced by all treatments but not all treatments increased grass production. Reduction in grass production with some treatments can be attributed to injury from the herbicide.

Visual evaluations of yellow starthistle control were made again on October 10, 1979. Control had decreased with all herbicides from the May 28, 1978 evaluation. Only picloram (K-salt) at .50 lb ai/A continued to give control above 60% with 89% control of yellow starthistle. Yield data was not collected in 1979 because the area was grazed by cattle. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843.)

Herbicide control of yellow starthistle on rangelands, Nez Perce County, Idaho one and eighteen months after treatment

Treatment[1/]	Rate	Dry weight (7/13/78) Yellow starthistle	Grass	Control[2/] 5/28/78	10/10/79
	(lb ai/A)	(lb/A)		--------(%)--------	
Control	0	2293	441	0	0
Picloram (2% pellets)	0.25	--	--	27	2
Picloram (2% pellets)	0.50	--	--	58	30
Picloram (2% pellets)	0.25	--	--	77	25
Picloram (2% pellets)	0.50	--	--	90	58
Picloram (5% pellets)	0.25	--	--	38	2
Picloram (5% pellets)	0.50	--	--	37	12
Picloram (K salt)	0.25	0	416	95	50
Picloram (K salt)	0.50	0	327	100	89
Picloram (K salt) + 2,4-D (amine)	0.125+0.25	120	341	90	22
Picloram (K salt) + 2,4-D (amine)	0.25+0.50	4	789	95	27
Dichlorprop	1.0	--	--	38	2
Dichlorprop	2.0	--	--	50	5
Dicamba	1.0	16	791	96	10
Dicamba	2.0	0	753	100	3
Dicamba + 2,4-D (amine)	0.5+1.5	222	578	88	8
Dicamba + 2,4-D (amine)	1.0+3.0	0	768	97	18
2,4-D (amine) spring/fall	1.0/1.0	--	--	53	10
2,4-D (amine) spring/fall	2.0/2.0	--	--	40	3

1/ Herbicides applied April 12, 1978.

2/ Visual evaluations are averages of three replications.

PROJECT 3

UNDESIRABLE WOODY PLANTS

Jim McHenry, Proect Chairman

SUMMARY -

Eight research reports were submitted for the woody plant project, six dealing with the control of chaparral species including environmental impacts, and two reports with sagebrush control.

CHAPARRAL:

- Study of the influence of brush control in Arizona with karbutilate on nutrient recycling and loss indicates a general increase in nitrate level in surface water.

- An integration brush management system in Arizona employing fire, mechanical methods, chemicals suggests that lower rates of soil-applied herbicides are required when employed following a burn to successfully achieve a type conversion.

- Simultaneous brush removal and soil incorporation of granular picloram and tebuthiuron with an anchor chain resulted in good control of chamise and red shank in California.

- Control of three year old interior liveoak resprouts in California has proven to be disappointing with 2,4-D, 2,4,5-T, dichlorprop, silvex, and triclopyr.

- Very acceptable control of old-growth scotchbroom was achieved in California with glyphosate, picloram, 2,4,5-T, and triclopyr.

- A study of bearmat control on California forest land provided good stand reductions with fosamine and glyphosate five years following application.

SAGEBRUSH:

- In Idaho, no significant improvement in control of big sagebrush was achieved with addition of niacin to 2,4-D compared to 2,4-D alone. All treatments containing 2,4-D combined with oil increased forage production.

- Combinations of 2,4-D & niacin in oil resulted in 98%-100% of big sagebrush following two applications; 2,4-D and triclopyr applied in oil achieved 85% control.

PAPERS -

CHAPARRAL:

Effects of converting chaparral to grass on the chemical composition of stream water. Davis, Edwin A. The side effects of increasing water yield from chaparral watersheds by converting selected areas from chaparral to grass are being examined. The effect of brush control on the nutrient status of the stream water is of particular importance. Nutrients in a watershed tend to cycle through the vegetation, organic debris, microorganisms, available nutrient supply, and the soil-rock pools of the ecosystem. Killing the vegetation in an area prevents the normal uptake of nutrients by that vegetation, thus interrupting one of the major pathways in the nutrient cycle. Some possible undesirable effects are loss of nutrients from the watershed, and enrichment of stream water which may result in eutrophication of streams and reservoirs and water unsuitable for drinking purposes.

A study was initiated to determine what effects converting a densely covered chaparral watershed (3-Bar F) to grass would have on the chemical composition of the stream water. Comparisons between treated and untreated watersheds provided a basis for determining treatment effects. The chaparral was dominantly shrub live oak and birchleaf mountainmahogany with a mixture of other shrub species. Water samples were collected weekly from streamflow through the gaging station weir. Collections were made more frequently during stormflow periods. The samples were analyzed for total soluble salts, electrical conductivity, hydrogen ion, calcium, magnesium, sodium, potassium, chloride, carbonate, bicarbonate, sulfate, phosphate, nitrate, and ammonium. The 3-Bar F watershed was treated in February 1969 with an aerial broadcast application of 10% active granules of karbutilate at 20 lb a.i./A. Rainfall conditions subsequent to treatment were ideal, and the response to the herbicide was rapid for a soil application.

A difference in chemical composition between water samples from the treated and untreated watersheds began nine months after treatment, when the vegetation was severely injured or defoliated. Nitrate was the major ion affected. The first year following treatment was characterized by a normal nitrate baseline concentration of about 0.2 ppm for the first eight months, followed by abnormal fluctuations during the ninth month. The highest concentrations were 10 and 24 ppm, associated with 1.6 inch to 2.1 inch rainstorms. The return-time to the baseline concentration following a December storm was 63 days. During the second year, peak concentrations occurred four times and ranged from 11-56 ppm nitrate. The return-time to the baseline concentration following a December storm was 141 days. The third year was characterized by five peak concentrations during late summer and fall. The peaks ranged from 11-65 ppm. The return-time to normal following an October storm lengthened to 273 days. After three years the karbutilate residues in the soil had decreased sufficiently to permit the watershed to be seeded with weeping lovegrass. The fourth year after treatment was an unusually high rainfall year. It provided conditions for what may be the maximum annual nitrate loss to occur from this converted watershed. By this time overall brush control was excellent. Only the minor species, yellowleaf silktassel and deerbrush ceanothus, appeared to be surviving. Precipitation during the fourth treatment year was 39.6 inches, nearly twice the average annual amount for the three previous years. This was an important year in the study; a drought lasting five months (January-May) was followed by a record fall-winter (October-March) rainy season with 44.1 inches of rain. The nitrate content of the stream water prior to the drought was 20 ppm; throughout the drought nitrate content remained in the 12-26 ppm range. During the subsequent fall and winter rainy season there were seven major peak concentrations ranging from 37-60 ppm, with intervening samples generally remaining above 30 ppm. Annual weighted mean nitrate concentrations steadily increased from 0.1 ppm to 36 ppm during the first four posttreatment years. Nitrate levels remained between 25 and 45 ppm through May of the fifth year and in the 10-27 ppm range for the remainder of the fifth year.

With the passage of time after the treatment, the nitrate concentration of the stream water gradually shifted upward; a greater proportion of the samples of each succeeding year, for four years, were in the higher nitrate concentration ranges.

Factor	Posttreatment year			
	1	2	3	4
Nitrate concentration (ppm)	- - - - - Number of days per year - - - -			
0.2 - 2.0	318	183	152	97
2.1 - 10.0	31	117	52	38
10.1 - 30.0	16	52	127	99
30.1 - 60.0	0	13	34	132
>45	0	6	6	95
	- - - - - - - - - - - ppm - - - - - - - - - -			
Maximum nitrate concentration	24	56	65	60
	- - - - - - - - - - inches- - - - - - - - -			
Annual precipitation	17.9	26.8	21.6	39.6

Samples with nitrate concentrations in the 0.2-2 ppm range occurred most frequently during the first posttreatment year. Those in the 2.1-10 ppm range predominated in the second year. The 10.1-30 ppm range was most common during the third year, while the 30.1-60 ppm range was most prevalent during the fourth year. Nitrate concentrations did not exceed the U.S. Public Health Service recommended maximum of 45 ppm nitrate for drinking water during the first year, but exceeded this limit on six days during each of the second and third years. During the high-rainfall fourth year the 45 ppm limit was exceeded on 95 days. The high nitrate concentrations that occurred during the fourth year was due chiefly to the abnormally high rainfall that year, but was undoubtedly also related to the length of time from treatment and the increasing availability of nitrogenous organic matter from the decaying roots and tops of the brush.

On this chaparral watershed, as well as on others in Arizona in which type conversions have improved water yield, there has been an associated increase in nitrate concentration of the stream water. Other anions and cations have not increased substantially. Elevated nitrate concentrations coincide with deadening of the brush and increased water yield. For the first few years of a successful treatment the pattern of nitrate concentration follows a wave form in which nitrate increases only after rainstorms of sufficient duration and amount to leach nitrates through the regolith into the stream channel. Between storms the nitrate returns to the baseline level. As the treatment becomes older, the reservoir of decayed brush roots and tops increases. During this second stage, nitrate concentrations can remain one or two magnitudes above normal if rainfall conditions are adequate to sustain increased water yields. A third stage should ultimately be reached when the reservoir of organically bound nitrogen in decayed roots is exhausted and the ammonium released from the remains of the aboveground parts is utilized by the established grass cover. During this stage the nitrate concentration in the stream water should return to the pretreatment level. In the vegetation type conversions under investigation adjustments to a disturbance of the nitrogen cycle may take a decade or longer. A return to baseline equilibrium conditions will probably not occur until the pool of nitrogen below the relatively shallow rooting zone of the grasses is leached through the regolith. (Rocky Mountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Arizona State University, Tempe, AZ. 85281).

Tests of soil-applied chemicals for chaparral management in Arizona. Davis, E. A., N. Rieger, and D. A. Bryant. This study is part of a larger research effort to develop integrated management systems using fire, chemicals, mechanical methods, and biological methods to create a mosaic of grass and shrubs in Arizona's chaparral country. Research on small watersheds has shown that forming grassy openings in dense chaparral improves streamflow and wildlife habitat, increases forage for livestock, and offers opportunities for enhancing recreational benefits and scenic diversity. One of the objectives of an integrated chaparral management program is to develop chaparral control procedures that utilize all practical control measures to provide the desired degree of control with as much protection to the environment as possible. The most effective mechanical method for eradicating chaparral is the root plow; however, its application is very limited because of topographical and soil constraints. Prescribed burning is an economical method for eliminating a dense chaparral overstory, but vigorous sprouting and rapid regrowth limit the value of fire. Only chemical methods, used singly or in combination with other methods, offer a practical solution for making most chaparral conversions. Every opportunity to reduce the load of chemicals on the environment should be explored so as to minimize detrimental side effects. For example, burning off the dense overstory and treating the sprouts may require less chemical than would be required for mature brush.

Tebuthiuron, karbutilate, buthidazole, and picloram were tested as granular or pellet formulations at 2,4, and 8 lb a.i./A. Picloram was tested as 10% active pellets and 5% active granules to determine if the more complete soil coverage afforded by the granules improves brush control. The other chemicals were tested with only one formulation for each chemical. All five treatments were made on one-year-old fire sprouts in August 1977. Tebuthiuron and karbutilate were also applied to mature chaparral in August 1977, and to both fire sprouts and mature chaparral in January 1978 to test the effects of summer versus winter applications, and to test the response of fire sprouts versus mature brush. Treatments were replicated four times. The study area is on Mount Ord in the Tonto National Forest at 6,000 feet elevation. Brush on the fire sprout area was burned by wildfire in June 1976. The unburned mature chaparral and fire sprout areas were located within one-half mile of each other. Vegetation on both areas is dominantly shrub live oak. The soil is a member of the clayey skeletal, mixed, mesic family of Typic Haplustalfs.

Results after two growing seasons are preliminary but probably indicative of the final outcome of the study. These results are given in the table. Tebuthiuron was the most effective herbicide against shrub live oak, followed in decreasing order by buthidazole, karbutilate, and picloram. Ten percent active pellets of picloram are more effective than 5% active granules, in spite of the more complete ground coverage by the granules. Although tebuthiuron and buthidazole are equally effective at 4 and 8 lb/A on fire sprouts, tebuthiuron is about twice as effective as buthidazole at 2 lb/A. Winter applications of tebuthiuron and karbutilate to fire sprouts are nearly equally effective, whereas the summer application of tebuthiuron was superior to that of karbutilate.

Control of fire sprouts and mature bushes of shrub live oak with soil-applied herbicides applied in the summer and in the winter

Herbicide	Rate	Fire sprouts Summer	Fire sprouts Winter	Mature brush Summer	Mature brush Winter
	lb a.i./A	- - - - - Percent top kill - - - -			
Tebuthiuron	2	84	76	62	57
	4	96	91	85	73
	8	100	92	99	95
Karbutilate	2	42	63	19	34
	4	56	88	84	69
	8	83	100	94	77
Buthidazole	2	35	-	-	-
	4	96	-	-	-
	8	100	-	-	-
Picloram (10%)	2	25	-	-	-
	4	58	-	-	-
	8	83	-	-	-
Picloram (5%)	2	3	-	-	-
	4	43	-	-	-
	8	73	-	-	-
Control	-	2	2	0	0

In the season of application comparison (summer versus winter), there is presently no clear difference. Since the summer application was made five months prior to the winter application, and the study is only two growing seasons old, injury to the summer plots would be expected to be slightly more advanced than the winter application.

It appears that a lower application rate can be used to control fire sprouts than mature brush. Top kill for both tebuthiuron and karbutilate at 2 lb/A was greater when applied to fire sprouts than to mature brush. Tebuthiuron at 2 and 4 lb/A on fire sprouts is comparable in effectiveness to 4 and 8 lb/A, respectively, on mature brush. This is also true for the winter application of karbutilate. A prescribed burn followed by a soil-applied herbicide treatment of the fire sprouts would appear, therefore, to be a possible method for reducing the amount of chemical needed to make a chaparral conversion. (Rocky Mountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Arizona State University, Tempe, AZ 85281, and College of Agriculture, School of Natural Renewable Resources, University of Arizona, Tucson, AZ, 85721).

<u>Control of chamise and redshank regrowth with soil active granular herbicides following brush clearing.</u> Graves, W. L. and S. R. Radosevich. Brush manipulation for fuel break and type conversion to reduce fire hazard and improve forage production for wildlife and domestic animals has been and is projected to be a primary activity of government managed brush-lands of San Diego County. Usually brush regrowth is the primary concern in follow-up maintenance of these brush cleared areas and herbicides have been a primary tool in reducing this regrowth. The maintenance herbicide applications usually occurs during the 2nd thru the 4th years growing seasons following the brush clearing work. The objective of this study was to determine if a granular soil active herbicide could be broadcast and soil incorporated during the chaining operation of the brush clearing work. Soil incorporation is desirable since this would minimize herbicide surface movement in the watershed and provide a better placement of the herbicide for quick root absorption. Secondly, the herbicide is available to act in a preemergence role to limit regrowth and seedling initiation which hopefully should minimize the herbicide application rate and follow-up maintenance on brush regrowth. Lastly, the herbicide should be selective so that the grasses that are used in the revegetation phase are not suppressed.

During a fuel break construction in the spring of 1975, two sites at 5,200 ft. were selected in separate stands of chamise (<u>Adenostoma fasciculatum</u>) and redshank (<u>A. sparsifolia</u>), two of the common brush species in Southern California chaparral. The chaining operation, using the modified chain, consisted of two passes in opposite directions to maximize uprooting and brush kill. The trials consisted of two replications per trial on separate stands of redshank and chamise. The plots were 40 ft. by 100 ft. with 10 ft. separator strips to minimize herbicide mixing across plots. Rates of 2 and 4 lb. ai/A of tebuthiuron 20G and picloram 10G were applied broadcast with a "cyclone" hand broadcaster following the first chaining. The second chaining phase was used for incorporation. Both areas were burned in late spring, 1975, to eliminate the dead slash from the chaining operation. One rain of approximately 1.5 in. and some snow (approximately 6 in.) occurred in the spring following the application, and 2 rains of approximately 2 in. total occurred in November and December 1975. The area was aerially seeded to wheatgrasses in December 1975. Vigorous brush regrowth occurred in late spring, 1975, and continued on to the date of the evaluation, January 25, 1976.

Tebuthiuron and picloram were effective in suppressing total plant regrowth of both chamise and redshank. Late spring ratings were made to assess the herbicides selectivity on the seeded grasses. Tebuthiuron suppressed first year growth of both shrubs and herbaceous vegetation. Picloram acted much more selectively by allowing grass and some broadleaf herbaceous species to colonize the site during the spring of 1976 and 1977. (University of California Cooperative Extension San Diego County and Botany Department, Davis, CA 95616).

Control of chamise and redshank regrowth[1/]

Herbicide	Formulation	ai/A	Site A Redshank		Site B Chamise	
			Regrowth	Total plant	Regrowth	Total plant
tebuthiuron	20 G	2 lbs	7.5	5.0	8.8	5.5
tebuthiuron	20 G	4	7.5	6.5	9.8	7.2
picloram	10 G	2	9.2	9.2	9.8	9.8
picloram	10 G	4	9.8	9.8	10.0	10.0
control			2.5	1.0	3.0	1.5

1/ visual evaluations made on January 25, 1976. 10 = 100% control

Woody plant control on coastal California rangeland. McHenry, W.B., W.H. Brooks and N.L. Smith. California has many acres of potentially productive coastal rangeland that is presently supporting various brush species. 2,4-D, 2,4,5-T, dichlorprop, silvex and triclopyr were evaluated for efficacy on the three-year old resprouts of mixed brush species near Hopland, California. Interior liveoak and California scrub oak were the principal species with California yuba santa, chamise, and hoary manzanita also present in most plots. A split plot design was employed with a summer application made July 2, 1976, with the adjacent plot treated October 29, 1976. Herbicides were applied in 30 GPA to 20 ft^2 plots using a CO_2 back-pack sprayer. Four replications were employed. A surfactant (X-77 @ 0.5% v/v) was included with triclopyr amine; diesel oil (1% v/v) was added to selected ester formulations of 2,4-D, 2,4,5-T, dichlorprop, silvex, triclopyr. Evaluations made the following year indicated that triclopyr ester (4 lb ai/A) alone and in combination with 2,4-D (2 + 2 lb ai/A) applied in the fall was effective on interior liveoak. Results on other species and from other herbicides could not be considered acceptable. Two years after application, however, herbicide effects had largely dissipated and renewed growth appeared. The retreatments were applied June 6 (summer) and November 7, 1978, (fall) and an additional series of treatments of silvex, 2,4-D + dichlorprop, and 2,4-D plus 2,4,5-T were added. Control of the species present could not be considered acceptable when an evaluation was made in September 1979. (University of California Cooperative Extension, Davis, CA 95616 and Ukiah, CA 95482).

Table 1:

Woody plant control - Mendocino County

Treated:
Summer: 7/2/76, 6/6/78
Fall: 10/29/76, 11/7/78

Herbicide	ai/A	Application timing	Chamise 6/17/77	Chamise 10/6/77	Chamise 5/19/78	Chamise 9/12/79	Hoary Manzanita 6/17/77	Hoary Manzanita 10/6/77	Hoary Manzanita 5/19/78	Hoary Manzanita 9/12/79
2,4,5-T +	2 + 2	Summer	2.3	1.8	0	3.7	3.3	1.5	0	2.5
2,4-D l.v.e.		Fall	3.0	1.3	0.3	2.0	0.3	0.8	0	0.3
2,4,5-T +	2 + 2	Summer	3.3	2.0	1.0	4.0	2.7	0.7	0.3	3.0
2,4-D l.v.e. 1/		Fall	1.3	4.7	0	5.3	0	0	1.3	1.0
triclopyr	2	Summer	1.0	0.8	0.3	5.3	1.0	0	0.3	2.3
l.v.e.		Fall	3.3	0.5	0	1.5	1.5	1.5	0	0.3
triclopyr	4	Summer	3.3	2.3	0	6.7	4.5	1.5	0	5.7
l.v.e.		Fall	2.0	1.7	0	2.5	0.5	0.3	0	0.5
triclopyr	4	Summer	1.7	1.3	0	4.0	5.0	4.2	2.0	3.3
l.v.e. 1/		Fall	3.7	2.0	0	5.3	3.5	3.3	1.8	5.8
triclopyr 2/	4	Summer	1.7	0.7	0.8	3.3	0.7	0	0	1.7
amine		Fall	3.0	1.3	0	0.3	0.7	0	0	0
triclopyr	2 + 2	Summer	1.3	2.2	0	7.0	4.3	1.5	1.3	5.7
l.v.e. + 2,4,5-T		Fall	8.5	6.5	1.5	2.7	0.5	3.0	0.8	1.7
triclopyr	2 + 2	Summer	0	3.5	0	10.0	4.0	3.0	0.8	7.7
l.v.e. + 2,4-D		Fall	2.0	1.0	10.0	-	4.0	6.3	2.3	2.0
Control		Summer	0	0	0	0	0	0	0	0
		Fall	0	0	0	0	0	0	0	0
2,4-D +	2 + 2	6/6/78				2.5				2.0
2,4,5-T l.v.e. 1/		11/7/78				-				-
2,4-D +	2 + 2	6/6/78				4.0				4.0
dichlorprop 1/		11/7/78				-				-
silvex l.v.e. 1/	4	6/6/78				4.0				1.0

1/ = Diesel @ 1%. 2/ = Surfactant (X-77) @ 0.5%.

Woody plant control - Mendocino County

Table 2:

Treated:
Summer: 7/2/76, 6/6/78
Fall: 10/29/76, 11/7/78

Herbicide	ai/A	Application timing	Interior Liveoak 6/17/77	Interior Liveoak 10/6/77	Interior Liveoak 5/19/78	Interior Liveoak 9/12/79	California Scruboak 6/17/77	California Scruboak 10/6/77	California Scruboak 5/19/78	California Scruboak 9/12/79
2,4,5-T +	2 + 2	Summer	4.0	4.5	0.5	2.8	3.7	2.7	0.7	2.0
2,4-D l.v.e.		Fall	4.3	4.3	1.0	1.8	3.3	2.7	1.3	1.0
2,4,5-T +	2 + 2	Summer	4.0	3.2	1.0	4.5	3.0	3.3	0.5	-
2,4-D l.v.e.1/		Fall	2.8	5.5	1.8	1.8	6.5	6.3	0	8.0
triclopyr	2	Summer	4.3	4.0	0	2.5	4.3	4.5	0.3	2.0
l.v.e.		Fall	4.3	4.5	1.0	0.8	3.0	4.5	1.0	0.7
triclopyr	4	Summer	4.3	5.0	0.8	7.3	4.0	3.0	0.5	7.5
l.v.e.		Fall	5.8	8.7	1.0	2.8	5.7	4.7	0.5	5.0
triclopyr	4	Summer	4.5	4.2	0.5	4.1	5.5	4.7	1.0	-
l.v.e. 1/		Fall	6.6	8.3	2.5	2.8	4.5	5.2	1.7	2.5
triclopyr	4	Summer	3.5	3.2	0	3.3	5.0	3.0	0.7	7.0
amine 2/		Fall	4.5	3.2	0.8	1.0	6.7	4.3	0	2.0
triclopyr	2 + 2	Summer	3.8	4.2	1.5	6.8	3.3	3.7	1.3	7.5
l.v.e. + 2,4,5-T		Fall	4.3	6.3	2.8	2.8	4.7	7.0	2.7	4.0
triclopyr	2 + 2	Summer	3.0	5.3	1.5	4.0	4.0	2.0	0.5	-
l.v.e. + 2,4-D		Fall	8.3	9.2	3.8	2.5	5.5	5.5	4.0	4.0
Control	-	Summer	0	0	0	0	0	0	0	0
		Fall	0	0	0	0	0	0	0	0
2,4-D +	2 + 2	6/6/78				0				0.3
2,4,5-T l.v.e.1/		11/7/78				1.0				-
2,4-D +	2 + 2	6/6/78				0.3				3.0
dichloprop1/		11/7/78				2.0				3.0
silvex1/	4	6/6/78				1.5				2.0
		11/7/78				0				0

1/ = Diesel @ 1%. 2/ = Surfactant (X-77) @ 0.5%.

<u>Seasonal response of scotch broom to five foliage-active herbicides.</u> McHenry, W.B., W. H. Brooks and N. L. Smith. Scotch Broom frequently invades rangeland and timber producing sites of coastal 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 (l.v. 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 (broom 1% flower, 50% leaf drop). Utilizing a spray volume of 40 GPA materials were applied to 20 by 20 ft. plots with a CO_2 backpack sprayer fitted with a single DOC 21 Spraying Systems nozzle. Four replications were employed.

Evaluations made the following year indicated good control from summer applications of 2,4,5-T, glyphosate (2 and 4 lb. ai/A) and triclopyr (4 lb. ai/A). Picloram (1 lb. ai/A) was exhibiting good control from both summer and fall applications. Plots were retreated June 7 and November 8, 1978. Growth stage of the broom corresponded closely to the previous years application dates. Picloram at a lower rate (0.5 lb. ai/A) was added on November 8, 1978. Again, excellent control was obtained from summer applications of glyphosate and triclopyr, and control from summer and fall applications of picloram was also effective. Fosamine was least effective. (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

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

1/ Diesel @ 0.5%

2/ Surfactant @ 0.5%

Bearmat control with five foliage-applied herbicides. McHenry, W.B., N. L. Smith and D. Irving. Bearmat, a low growing difficult to kill plant, infests many acres of California forest land. Establishment of desirable conifer species is extremely difficult due to the strong competitive pressure exerted by this troublesome weed. A mature stand of bearmat in Calaveras County was selected as the site to test the efficacy of five foliar applied herbicides. A split plot design was employed to compare spring (June 13) and fall (October 30) treatments in 1974. Treatments were applied to 10 ft. by 20 ft. plots utilizing a spray volume of 40 GPA (80 GPA for fosamine). Fosamine, triclopyr and Dowco 290 applications included 0.5% v/v surfactant (Surfax), with diesel at 1% v/v added to 2,4-D l.v.e. treatments. Four replications were employed. Bearmat was fully mature and in late bloom for the June application. The fall application was made just prior to winter dormancy. An evaluation of the spring application in the fall of 1974 indicated good topkill from 2,4-D, triclopyr and glyphosate. The following year only the spring applications of glyphosate exhibited acceptable stand reduction of bearmat. None of the materials applied in the fall exhibited any degree of control. Spring treatments of glyphosate and fosamine at 8 lb ai/A were still exhibiting stand reduction in 1979, five years after application. This experiment indicates that fosamine and glyphosate can be effective tools for the control of bearmat. (University of California Cooperative Extension, Davis, CA 95616).

Applied:

Summer: 6/4/,13/74
Fall: 10/30/74

Seasonal response of bearmat to five herbicides

			control (10=100%)			
			10/30/74			
Herbicide	ai/A	timing	topkill	regrowth	10/14/75	6/4/79
2,4-D l.v.e.	1	Spring	9.9	1.5	2.0	0.3
		Fall	-	-	0	0
2,4-D l.v.e.	2	Spring	10.0	1.5	0.5	0
		Fall	-	-	1.5	0
2,4-D l.v.e.	4	Spring	10.0	7.3	1.3	0.3
		Fall	-	-	5.3	1.5
triclopyr amine	1	Spring	10.0	1.3	0.3	0
		Fall	-	-	0.3	0
triclopyr amine	2	Spring	9.8	0.5	0.3	0
		Fall	-	-	2.5	0
triclopyr amine	4	Spring	10.0	6.8	0	0
		Fall	-	-	5.3	1.0
Dowco 290	1	Spring	5.0	3.8	0	0
		Fall	-	-	0	0
Dowco 290	2	Spring	4.5	2.3	0.3	0
		Fall	-	-	0	0
Dowco 290	4	Spring	4.3	6.3	0.5	0
		Fall	-	-	0.3	0
fosamine	2	Spring	1.8	9.5	0.5	0
		Fall	-	-	0	0
fosamine	4	Spring	1.8	9.3	1.0	1.0
		Fall	-	-	0	0
fosamine	8	Spring	6.5	8.3	6.0	4.8
		Fall	-	-	0	0
glyphosate	2	Spring	8.4	9.3	7.2	4.0
		Fall	-	-	0.3	0
glyphosate	4	Spring	9.7	9.0	8.8	5.0
		Fall	-	-	1.0	0
glyphosate	8	Spring	9.9	9.4	9.2	6.5
		Fall	-	-	4.6	3.5
control	-		0	-	0	0

SAGEBRUSH:

Effect of herbicides on the control of dormant big sagebrush and forage yields 13 months after treatment. W. S. Belles and D. W. Wattenbarger. Herbicide treatments were applied to a stand of dormant big sagebrush in Valley County, Idaho on May 3, 1978. Plots were 18 by 30 feet replicated three times in a randomized complete block deisgn. Treatments were applied with oil or water carrier at 5 gpa using a knapsack sprayer. Sagebrush control was evaluated visually 13 months after treatment on June 21, 1979. Forages were harvested July 31, 1979 from two 2.5 sq. ft. circular areas in each plot and air-dry weights determined.

All treatments except glyphosate at 2.0 and 4.0 lb ai/A significantly controlled big sagebrush. Control of 90% or better was obtained with 2,4-D (LVE) + niacine at 3.0 lb ai/A + 8.0 g/A with both oil and water as carrier, and the 3.0 lb ai/A rate of 2,4-D (LVE) without niacin. Niacin did not significantly affect control of 2,4-D (LVE) in oil or water. The 2,4-D (LVE) + triclopyr combinations with oil and water carriers resulted in comparable control of 66 and 70%, respectively.

Yield of forages in treated plots was increased 1.5 to 2.5 times that of the untreated control. Increases were significant at the 5% level with the 2,4-D (LVE) + niacin 2.0 lb ai/A + 8.0 g/A treatment and 2,4-D (LVE) at 2.0 and 3.0 lb ai/A treatments all with oil as carrier. Forages were primarily downy brome and perennial fescue and bluegrass in all plots except those treated with glyphosate in which forages were approximately 50% grasses and 50% forbes. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide control of dormant big sagebrush

Treatment	Carrier	Rate	Big sagebrush control 6/21/79	Forage yields 7/31/79
		(lb ai/a)	(%)	(lb/A)
Control	-	0	0b[2]	280b
2,4-D (LVE) + Niacin[1]	oil	2.0	71a	696a
2,4-D (LVE) + Niacin	oil	3.0	90a	446ab
2,4-D (LVE)	oil	2.0	70a	696a
2,4-D (LVE)	oil	3.0	75a	723a
2,4-D (LVE) + Niacin	H_2O	2.0	83a	662ab
2,4-D (LVE) + Niacin	H_2O	3.0	91a	575ab
2,4-D (LVE)	H_2O	2.0	77a	508ab
2,4-D (LVE)	H_2O	3.0	93a	595ab
2,4-D (LVE) + triclopyr	oil	1.0 + 1.0	66a	612ab
2,4-D (LVE) + triclopyr	H_2O	1.0 + 1.0	70a	541ab
Glyphosate	H_2O	2.0	10b	522ab
Glyphosate	H_2O	4.0	13b	428ab

[1]Niacin applied at 8.0 g/A

[2]Values followed by the same letter are not significantly different at the 5% level, according to Duncan's multiple range test.

The control of big sagebrush on central Idaho rangeland 2 years after treatment. Wattenbarger, D. W. and W. S. Belles. Big sagebrush is a troublesome weed that limits productivity of Idaho's rangelands. A study was initiated on rangeland near Donnelly, Idaho on April 25, 1977 to evaluate the performance of herbicides applied in oil and water to big sagebrush while still dormant and the subsequent effect on forage yields. Forage consisted of native perennial and annual grasses. Treatments were applied with a three-nozzled boom back pack sprayer at a 5 gpa rate using ss 8001 nozzles. Plots were 2 sq. rd. in size (18 by 30 ft.) replicated three times in a randomized complete block design. Visual evaluations of percent control were taken on June 6, 1978. Forage was harvested on August 16, 1978 from two 2.5 ft. diameter circles, dried and weighed.

Visual evaluations showed significant big sagebrush control with all treatments one year after application. The highest percent control (98) was obtained with the two 2,4-D LV ester plus niacin treatments with oil as the carrier. The poorest control was obtained with the 2,4-D plus triclopyr at 1.0 plus 1.0 lb ai/A. This treatment with water as a carrier gave poorer control than where applied with oil. The 2,4,5-T oil at 2.0 lb ai/A resulted in poorer big sagebrush control than 2,4-D plus niacin at 2.0 lb ai/A with the oil carrier. No difference was found between the 2,4,5-T-water treatment with the 2,4-D plus niacin - water applications.

Dry forage was significantly increased by six of the eight herbicide treatments. These six treatments averaged 1728 lb. of dry forage per acre compared to 520 lb. on the untreated control.

Big sagebrush control 2 years after treatment generally increased from the first year of evaluation. In 1978, many plants exhibited both dead and live aerial portions. In 1979 many of those plants exhibited no live aerial portions. 2,4-D LV ester plus niacin continued to show excellent control (98% or better). Control with 2,4-D LV ester applied in oil did not increase appreciably from 1978 but when applied in a water carrier, control increased from the first year of evaluation and was equal to oil carrier by the second year after application. Control by 2,4,5-T LV ester increased only slightly from the first to second year after application. Treatment with 2,4-D LV ester plus triclopyr in oil increased by the second year but not when applied in water.

The area was grazed in 1979 and forage yields were not determined. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide control of dormant big sagebrush

Treatment	Carrier	Rate	Control 6/6/78	Dry forage yield 8/16/78	Control 6/21/79
		(lb ai/A)	(%)	(lb/A)	(%)
2,4-D (LV ester) + Niacin[1/]	oil	2.0	98a[2/]	1590a[2/]	99[3/]
2,4-D (LV ester) + Niacin	oil	3.0	98a	1530a	100
2,4-D (LV ester) + Niacin	H_2O	2.0	89ab	1630a	99
2,4-D (LV ester) + Niacin	H_2O	3.0	93ab	1650a	98
2,4,5-T (LV ester)	oil	2.0	75bc	1230ab	78
2,4,5-T (LV ester)	H_2O	2.0	80abc	1880a	85
2,4-D (LV ester) + triclopyr	oil	1.0 + 1.0	68c	2090a	83
2,4-D (LV ester) + triclopyr	H_2O	1.0 + 1.0	35d	1310ab	31
Control	-	-	0e	520b	0

1/ Niacin at 8.0 gm/A

2/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

3/ Statistics not complete

PROJECT 4

WEEDS IN HORTICULTURAL CROPS

Garvin Crabtree - Project Chairman

SUMMARY -

The horticultural crops section of the Research Progress Report contains 43 reports, representing research in Arizona, California, Idaho, New Mexico and Oregon. These are summarized by crops, or crop groups, in the following paragraphs.

Tomatoes (20 papers) - Tomato weed control research centered on evaluation of herbicides and the evaluation of carbon or protectant systems to improve herbicide selectivity. Other factors evaluated in conjunction with herbicide applications were method of herbicide incorporation into the soil and irrigation interactions.

Herbicide combinations, such as napropamide plus diphenamid or napropamide plus pebulate, often performed better than a single herbicide. Attempts to control nightshade met with varying degrees of success, with chlorpropham, ethalfluralin and napropamide plus pebulate among those treatments reported as providing selective control. Selective control of nutsedge was obtained by several herbicides.

In evaluation of protectant systems, plug planting was usually superior to direct planting. Other protectant systems, such as coated seed or hydrogel planting, improved selectivity with herbicides over direct seeding methods. Some success was reported in attempts to reduce costs by using less expensive materials in plug mixes.

Comparisons of method of soil incorporation, for herbicides used in tomatoes, indicate that the best method (optimum placement) is a function of the specific herbicide. This effect was also apparent when amounts of irrigation following herbicide application were evaluated.

Cantaloupes and melons (5 papers) -

Evaluation of herbicides for weed control in these crops gave the result that good selective control could be obtained, with the best herbicide choice dependent on the wood species complex present. Chloramben, ethalfluralin and napropamide were among those herbicides reported in these studies providing selective control. Use of plug mix planting and comparison of bed shaping methods were also discussed in relation to the use of herbicides in these crops.

Other vegetable crops (11 papers) -

Green beans, beets, carrots, sweet corn, cucumbers, onions, peas and potatoes were included in other studies reported in the Horticultural Crops project. In herbicide evaluation studies a number of selective treatments were reported for some of these crops. Interaction of EPTC with other chemicals was apparent in phytotoxic reactions of this herbicide in sweet corn.

Tree crops (4 papers) -

Highlights of these four studies include reports of differential cultivar tolerance to oxyfluorfen plus simazine applied to almonds, good nutsedge control in pistachios with fluridone, some indications of phytotoxicity to figs with subsurface layer applications of dichlobenil and good crop tolerance in apples and pistachios with glyphosate applied as basal trunk sprays.

Grapes, nursery and ornamental crops (3 papers) -

One study reported better bermudagrass control in grapes when glyphosate was applied as a low volume spray and when surfactant was added. In another study high volumes of glyphosate were required for best control of pampas grass. In a trial in nursery crops combinations of napropamide and oxidiazon gave good selective weed control.

Screening of preplant incorporated herbicides in plug-planted and direct-seeded tomatoes. Elmore, C.L., and J. Woods. A screening trial was conducted in processing tomatoes (VF-145B 7879) on the U.C. Davis campus to establish weed control and crop tolerance information with preplant incorporated herbicides. Treatments were applied on this Yolo clay loam by CO_2 backpack June 2, 1979, and were incorporated immediately with a power tiller to a depth of 1.5 inches. Plots were 60 inches by 15 feet with a row of direct-seeded and a row of plug-planted tomatoes in each plot. All treatments were replicated 4 times. Planting by both methods was done on June 6, 1979. Plugs used in this trial were 60 milliliter in volume and consisted of a commercial 1:1 mix of peat and vermiculite with 5% activated carbon added. The tomatoes were furrow irrigated with the first irrigation occurring June 9, 1979.

Plots were evaluated for tomato stand and vigor and also weed control on July 3, 1979, and again for weed control on August 9, 1979. Barnyardgrass seed was planted in the pebulate and pebulate plus extender plots on August 20, 1979 to evaluate whether the addition of extender lengthens the soil activity of pebulate. Barnyardgrass emergence was then rated on September 10, 1979 in these plots.

Tomato vigor was increased in all treatments by plug planting with the greatest increase in safety occurring in the ethalfluralin,NC 20484, chlorpropham, and chlorpropham plus PPG 124 plots. Pebulate and Dowco 295 both appeared fairly safe in this trial even in the direct-seeded rows. Although plug planting increased the safety of NC 20484 and metribuzin, substantial injury was still encountered at the high rates of both these compounds.

Weed control was good to excellent in most treatments with the predominant species encountered being barnyardgrass, pigweed (*Amaranthus spp.*) and common purslane. NC 20484 and chlorpropham both appeared weak in this trial on barnyardgrass and pigweed. The addition of extender to pebulate did not appear to significantly increase the soil life of this material. (University of California Cooperative Extension, Davis, CA 95616)

Effect of preplant incorporated herbicides on the stand, vigor and weed control in tomatoes

		Stand[1/]		Vigor[2/]		Weed control				
	Rate	direct		direct		barnyardgrass			pigweed	purslane
Herbicide	lb ai/A	seed	plug	seed	plug	3/	4/	5/	3/	3/
ethalfluralin	2.0	0.5	7.8	1.8	7.0	9.9	9.3		9.8	9.8
ethalfluralin	4.0	0.2	7.8	1.8	7.0	10.0	10.0		10.0	10.0
NC 20484	1.0	3.2	9.0	1.8	6.0	5.5	1.5		6.5	9.2
NC 20484	2.0	2.8	9.5	1.5	4.5	6.8	1.8		8.5	9.8
pebulate	8.0	6.8	9.5	5.8	8.0	7.5	4.8	1.5	9.5	10.0
pebulate	16.0	8.8	9.8	5.2	6.5	9.5	7.0	1.8	9.8	10.0
pebulate + Ext.	8.0	8.8	9.0	5.8	7.2	7.0	4.5	4.3	7.2	10.0
pebulate + Ext.	16.0	8.0	9.2	5.5	7.0	9.0	5.8	0.8	9.5	10.0
metolachlor	3.0	6.8	9.0	5.8	7.8	9.8	8.0		9.5	8.5
metolachlor	6.0	5.2	10.0	4.2	7.0	10.0	10.0		9.9	9.8
Dowco 295	3.0	7.8	10.0	7.0	8.0	9.2	8.8		8.2	7.5
Dowco 295	6.0	6.0	8.8	6.5	7.2	9.8	9.0		9.8	9.2
chlorpropham	3.0	2.5	9.8	2.5	6.2	3.2	0		5.0	8.0
chlorpropham	6.0	0.0	8.2	0.0	7.5	6.0	3.3		5.8	9.5
chlorpropham + PPG 124	3.0	0.5	10.0	0.8	7.8	3.8	0.3		6.8	9.5
chlorpropham + PPG 124	6.0	0.2	7.5	0.5	6.5	6.5	3.5		6.5	10.0
metribuzin	1.5	5.0	9.2	5.5	7.2	7.8	5.8		10.0	10.0
metribuzin	3.0	5.8	9.0	5.5	5.8	9.6	8.8		10.0	10.0
untreated	-	7.2	9.5	6.8	8.2	0.5	0		1.8	0.0

1/ Stand: visual evaluation 10 = complete stand; 0 = no stand; evaluated July 3, 1979
2/ Vigor: 10 = vigorous; 0 = dead plants; evaluated July 3, 1979
3/ Weed control: 10 = complete control; 0 = no control; evaluated July 3, 1979
4/ Weed control: 10 = complete control; 0 = no control; evaluated August 9, 1979
5/ Weed control: 10 = complete control; 0 = no control; evaluated September 10, 1979

Screening preplant incorporated herbicides for weed control in processing tomatoes. Lange, A. H. and J. T. Schlesselman. Most of the tomato acreage in California utilizes furrow irrigation. Under furrow irrigation most preemergence herbicides require at least shallow incorporation for activation. The objective of this experiment was to evaluate seven new herbicides for direct seeded and plug planted processing tomatoes in a Panoche clay loam at the West Side Field Station, Five Points.

On April 12, 1979, the herbicides were applied in 50 gallons per acre and incorporated immediately. The entire five feet of bed was sprayed but only the 30 inch center was incorporated with a power driven Howard rotovator run three inches deep. The plots were sprinkled up and then switched to furrow. This was necessary because of an adjacent preemergence experiment. The plots were 15 feet long but on 12 feet of each was sprayed leaving a three foot buffer at the end of each plot to prevent carrying treated soil with the power incorporator. One side of each bed was direct seeded with UC 82 or plug planted with our standard peat-vermiculite mix.

All the herbicide treatments gave excellent early weed control. Most of the new number herbicides were phytotoxic even in the plug. Those treatments such as those containing chlorpropham were greatly safened by the plug. Because of the lateness of the planting and other factors, neither plug nor direct seeded were good stands as seen by the untreated check phyto ratings which reflect poor stands.

Outstandingly safe was Ortho 28269 which gave excellent broadleaf weed control and fair grass control. Most important, it appears to control the seeded hairy nightshade and groundcherry even at 1/2 lb ai/A. This is difficult to understand when chlorpropham did not, unless it was ineffective because of incorporation depth and soil type. The degree of phytotoxicity was clearly seen from the thinning weights from the direct seeded plots. Again Ortho 28269 showed considerable safety on tomatoes at the 1/2 lb ai/A rate. It did not have a 4X safety factor but might if used at lower rates for broadleaf weed control. Used with the plug, however, it would appear to have sufficent safety, nightshade and possibly even nutsedge control.

The drastic effect of weed competition can be seen by comparing the untreated check with napropamide at 1 lb ai/A. (University of California, Cooperative Extension, 9240 South Riverbend Ave., Parlier, CA 93648).

The effect of several preplant incorporated herbicide treatments on weed control and direct seeded and plug planted processing tomatoes

Herbicides	lb/A	Broad-leaves[2/]	Plug Phyto	Average[1/] Direct Seeded Phyto	Fresh weight[3/] in grams
Napropamide	1	8.8	4.2	4.8	1666.2
Napropamide+Diphenamid	2+12	9.2	5.0	6.2	1076.2
Napropamide+Diphenamid	1+6	9.0	0.2	2.0	1440.2
Napropamide+Chlorpropham	1+2	9.2	2.0	7.0	726.8
Napropamide+Chlorpropham	1+4	9.0	3.5	8.2	187.2
NC 20484	1	9.2	6.5	9.0	127.0
NC 20484	4	10.0	10.0	10.0	0.0
Am.Cy. 213975	1	10.0	9.8	10.0	0.0
Am.Cy. 213975	4	10.0	10.0	10.0	0.0
PPG 225	1/4	9.2	5.2	10.0	94.0
PPG 225	1	10.0	9.5	10.0	0.0
UBI S-734	1/4	7.2	5.0	6.2	238.5
UBI S-734	1	8.8	5.0	10.0	0.0
Ortho 26197	1/2	10.0	4.2	9.5	80.8
Ortho 26197	2	10.0	8.5	10.0	15.8
Ortho 28269	1/2	8.0	3.8	3.8	1310.2
Ortho 28269	2	10.0	4.8	10.0	0.0
Ethalfluralin	2	10.0	4.0	10.0	0.0
Check	-	3.8	4.0	4.0	283.0

1/ Average of 4 replications where 0 = no effect and 10 = complete control. Treated 4/12/79. Evaluated May 15, 1979.

2/ Mainly rough pigweed and lambsquarters.

3/ Fresh weight of tomato plants from the direct seeded plots at thinning.

Screening new preemergence herbicides for weed control in tomatoes. Lange, A. H. and J. T. Schlesselman. Although the probability of finding a new selective herbicide for tomatoes, especially one that would take nightshade out of tomatoes is small, we should not discard the possibility. The object of this screening trial was to test the new numbered herbicides for safety in tomatoes and for weed control in general but including a seeded mixture of nightshade and groundcherry. The tomatoes were direct seeded and plug planted April 14, 1979. The herbicides were applied in 100 gallons per acre the small 5 by 10 foot plots. The herbicides were sprinkled in and later the crop was furrow irrigated.

The herbicides and combinations gave good general weed control especially at the high rates. The tomatoes were protected by plug with most herbicides and rates except for Am. Cy. 213975 and PPG 225. The degree of injury to direct seeded tomatoes was emphasized by the fresh thinning weight of plants from the plots. The fresh weights again substantiated the safety of napropamide and diphenamid. The poorer fresh weight with chlorpropham was due to the poor lambsquarters and pigweed control as well as phytotoxicity from the chlorpropham in the direct seeded plots. The tomatoes were not affected in the plug planted plots. (University of California, Cooperative Extension, 9240 South Riverbend Ave., Parlier, CA 93648).

Preemergence herbicides on weed control in direct seeded and plug planted tomatoes

Herbicides	lb/A	Average[1/] Broadleaves	Grasses	Plug Phyto	Direct Seeded Phyto
Napropamide	1	5.2	7.8	0.5	2.5
Napropamide+Diphenamid	2+12	8.0	7.2	2.5	2.0
Napropamide+Diphenamid	1+6	8.0	9.0	1.5	3.5
Napropamide+Chlorpropham	1+2	6.2	6.2	3.0	8.0
Napropamide+Chlorpropham	1+4	8.8	8.8	2.0	9.0
NC 20484	1	6.5	9.0	4.2	9.2
NC 20484	4	9.8	9.8	8.2	10.0
Am.Cy. 213975	1	10.0	9.2	8.2	10.0
Am.Cy. 213975	2	9.8	9.0	8.8	10.0
Ethalfluralin	2	9.8	8.8	2.2	8.5
Ethalfluralin	4	10.0	10.0	2.0	9.8
PPG 225	1/4	10.0	5.0	4.8	9.8
PPG 225	1	10.0	9.5	8.0	10.0
UBI S-734	1/4	1.8	8.8	2.5	3.8
UBI S-734	1	5.8	9.5	8.0	7.5
Metolachlor	1	9.2	10.0	3.5	6.2
Metolachlor	2	9.8	10.0	3.5	9.0
Ortho 26197	1/2	9.0	7.2	3.5	7.8
Napropamide+Chloramben	1+2	10.0	9.5	1.0	6.5
Pebulate	8	9.5	9.5	1.0	6.5
Pebulate	16	10.0	10.0	3.0	6.8
Pebulate+Extender	8	10.0	10.0	2.2	8.5
Pebulate+Extender	16	9.0	10.0	0.8	7.8
Chloramben	2	9.8	10.0	3.5	5.5
Chloramben	4	9.2	8.2	2.5	6.8
Dowco 295	1	5.5	7.8	1.2	1.8
Dowco 295	2	5.5	8.5	2.0	3.5
Check	-	1.0	1.2	0.8	3.8

1/ Average of 4 replications where 0 = no effect, 10 = complete control. Evaluated 5/15/79.

The effect of preemergence herbicides in combination with napropamide for black nightshade control in processing tomatoes. Lange, A. H., and R. A. Brendler. The herbicides were applied to a silty clay loam May 23, 1979 and sprinkled in with an unknown amount of water (clay 30%, silt 53%, sand 17%, organic matter 1.6%). The plugs were plug planted prior to herbicide application using a standard 50:50 peat vermiculite mix. Each plot was replicated six times in a randomized block design.

The herbicide treatments containing chlorpropham or ethalfluralin were the most effective in the early rating (June 5, 1979). The form of chlorpropham appeared slightly better for weed control but was not statistically different. The 124 form of chlorpropham caused some stunting showing less safety than the less residual form, which again suggested the necessity of short lived herbicides for maximum advantage in plug planting as the roots move from the plug to the treated soil.

Black nightshade control was best with the more residual form of chlorpropham in the June 24, 1979 ratings, however, the injury was more severe on the tomatoes. Ethafluralin and metolachlor were not quite as selective (with plugs) as chlorporpham when considering the control of black nightshade. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648.)

The effect of preemergence herbicide treatments on the control of black nightshade and the stand of plug planted processing tomatoes.

		Average 1/	
Herbicides	lb/A	Tomato Vigor	Weed Control
Chlorpropham + Napropamide	2+2	6.8	7.5
Chlorpropham + Napropamide	4+2	6.3	8.2
Chloramben + Napropamide	2+2	7.5	2.7
Chloramben + Napropamide	4+2	7.7	3.5
Ethalfluralin + Napropamide	1+2	7.7	6.7
Ethalfluralin + Napropamide	2+2	5.5	8.5
Metolachlor + Napropamide	1+2	7.7	4.8
Metolachlor + Napropamide	2+2	7.2	4.2
Chlorpropham-124 + Napropamide	4+2	6.2	8.0
Chlorpropham-124 + Napropamide	4+2	6.2	8.8
Nitrofen + Napropamide	2+2	6.3	9.2
Check	-	8.5	0.3

1/ Average of six replications where 0 = no effect, no stand; and 10 = complete control, best stand. Treated 5/23/79. Evaluated 7/5/79.

Evaluation of nightshade weed control with post emergence applications of metribuzin (Sencor) on seedling tomatoes. Agamalian, H. The experiment was established on the variety U.C. 82. The tomatoes were in the 3-4 true leaves. A mixed population of hairy and black nightshade were present at time of treatment. The black nightshade was in the 2-4 leaf stage of growth.

Sencor was applied in a total volume of 60 gallons per acre. Nonphytotoxic oil was applied at the 1% by volume ratio. The surfactant AG-98 was applied at a 0.5% by volume ratio.

The weather at time of treatment was slightly overcast, air temperature was 84°F.

The data collected on Table 1 indicates excellent black nightshade control with all rates of Sencor. The only treatment that gave commercial control was the combination of Sencor with AG-98 surfactant.

Initial tomato selectivity resulted in some crop suppression with all ratios of Sencor. Later crop vigor evaluations indicated tomato growth at the 0.5% lb/a., treatment was comparable to the weeded control.

Although yield data were not obtained, a percent ripe fruit sample indicated comparable maturity range with the 0.5 lb/a treatment and the control.

The selectivity of Sencor when applied at the 3-4 tomato leaf stage is marginal, excellent black nightshade control can be obtained. Additives did not enhance the control of black nightshade. 501-425-178-27-3-79. (University of California Cooperative Extension, Salinas, California).

TABLE 1: Evaluation of Nightshade Control with Post Emergence Applications of Sencor on Seeding Tomatoes. 501-425-178-27-3-79

HERBICIDE	LB/A	EVALUATED MAY 4 HNS	BNS	TOMATO PHYTO	5/25 TOMATO VIGOR	9/12 TOMATO %RIPE
SENCOR	0.5	2.6	9.6	3.6	7.0	86%
SENCOR	0.75	7.6	10.0	7.0	5.0	76%
SENCOR	1.0	5.6	9.6	5.6	5.3	66%
SENCOR + NPO	0.25	5.6	9.6	4.3	7.3	86%
SENCOR + NPO	0.5	5.0	9.6	4.0	8.3	80%
SENCOR + NPO	0.75	5.3	10.0	4.6	6.7	76%
SENCOR + NPO	1.0	5.6	10.0	6.3	6.0	60%
SENCOR + AG 98	0.5	8.6	10.0	5.6	6.3	80%
CONTROL	0	0	0	0	8.6	86%

Evaluation of herbicide combinations for nightshade control in seeded tomatoes. Agamalian, H. The herbicides were applied preplant incorporated into a clay loam soil with 1.25% organic matter. All herbicides were applied with a CO_2 spraying unit at a total volume of 60 gallons/A. The plots were single beds, the area treated was 3 ft. by 40 ft. Immediately following herbicide application a sidewinder tiller with L-shaped knives was used for incorporation. Incorporation depth was 3 inches. Sprinkler irrigation followed 3 days after treatment. The results are presented in table 1.

Both pebulate (Tillam) and napropamide (Devrinol) combinations provided 90% hairy nightshade weed control. One of the Tillam plus Devrinol treatments included the thio-carbamate inhibitor. This was added to observe tomato growth effects. No differences were observed. The Devrinol plus Sencor (metribuzin) combination provided 80% hairy nightshade control, but also caused some reduction in tomato vigor. Combinations of Devrinol plus Vegadex (CDEC) and Devrinol plus Enide (diphenamid) did not provide adequate nightshade control. Yield data did not indicate any major differences between the respective treatments. 501-425-181-27-1-79. (University of California Cooperative Extension, Salinas, California).

TABLE 1: Evaluation of Herbicide Combinations for Nightshade Control in Seeded Tomatoes. 501-425-186-27-1-79

HERBICIDE	LB/A	5/21 TOMATO VIGOR	7/25 TOMATO VIGOR	7/25 HAIRY NIGHTSHADE	YIELD TONS/A RED FRUIT
DEVRINOL + SENCOR	2+0.5	6.5	8.2	8.0	32.5
DEVRINOL + TILLAM®	2+6	9.2	9.8	9.0	34.1
DEVRINOL + VEGADEX	2+6	9.0	10.0	7.0	34.0
DEVRINOL + ENIDE	2+5	10.0	10.0	3.0	35.2
DEVRINOL + TILLAM	2+6	9.8	10.0	9.0	33.8
CONTROL	0	10.0	10.0	0	34.0

® = thiocarbamine inhibitor added 0.5 lb/a

Herbicide evaluation in plug planted UC-82 tomatoes under sprinkler irrigation. Kempen, H. M. and J. Graf. Four herbicides were evaluated as to their safety and efficacy of Black nightshade control under sprinkler irrigation. Plots were on a hesperia fine sandy loam and were 60 inches by 75 ft. with 6 replications. Herbicides were applied with a CO_2 backpack sprayer at 35 gpa on formed beds. UC-82 tomatoes were plug planted, the 85 ml. plug formulated with 10% Gro-Safe activated carbon and contained 3 to 5 tomato seeds per plug. The herbicides were sprinkler incorporated with 3 inches of water one day after application.

Results suggest that chlorpropham at 1.5 or ethalfluralin at 1.5 lbs. AI/A gave adequate Black nightshade control and that adequate safety on light sandy loam soils occurred even at double these rates. Effectiveness may have been lessened by interval between treatment and incorporation with Tillam, Treflan and Sonalan. (Cooperative Extension, University of California, P.O. Box 2509, Bakersfield, Ca. 93303).

Herbicidal evaluation in 1979 plug planted UC-82 tomatoes under sprinkler irrigation.

Herbicides	Lbs/A	Tomato response 1/ Vigor reduction 4-24	5-12	Injury 6-11	Yield T/A 8-17	Black nightshade 1/ control 4-24	5-12
Check	--	0	0	1.8	33.7	1.8	2.3
Chlorpropham	1.5	1.2	1.7	1.5	30.7	8.8	8.8
Chlorpropham	3.0	3.5	4.0	1.8	28.3	10.0	10.0
Ethalfluralin	1.5	1.7	1.2	1.7	33.7	9.5	8.0
Ethalfluralin	3.0	2.7	3.0	2.0	34.3	8.8	9.5
Trifluralin	1.0	1.2	.3	1.8	30.6	5.5	6.5
Pebulate	4.0	0.0	.3	2.0	32.2	4.2	4.2
Pebulate	8.0	0.3	.5	1.7	34.7	3.7	2.8
LSD .05 =		1.0	0.8	1.2	4.6	2.4	2.4

1/ 0 = no reduction, injury or control; 10 = 100% reduction, injury or control.

Yield of plug planted versus direct-seeded processing tomatoes at two planting dates. Elmore, C.L., and J. Woods. In the past few years, plug planting of processing tomatoes has become a commercial practice with some growers in California. Problems with crusting and/or tolerant weeds have encouraged growers to adopt this planting method. Although plug planting is becoming increasingly accepted, little yield information has been developed. Of particular concern is the yield of plug planted tomatoes when they are established during hot weather. The plugs will dry out readily under hot, dry conditions, and if a grower is unable to irrigate frequently, stand establishment will be impaired.

This trial was initiated on the U.C. Davis campus to generate yield data for plug planting versus direct-seeding at both an early and a late planting date. The mean daily high temperature for the ten days following the first planting on April 12, 1979 was 70.9 F while that for the second planting on June 5, 1979 was 93.6 F. The soil type was a Yolo sandy loam, and the trial was furrow irrigated throughout the season.

Two herbicide combinations plus a weeded check were included with the plug versus direct comparisons, and all plots were replicated four times. Herbicides were applied by CO_2 backpack on April 11, 1979 (first planting) and June 3, 1979 (second planting) and were incorporated immediately to a depth of 2 inches with a power tiller. The herbicide subplots were 60 feet long and only the center 20 inches of the bed (5 feet wide) was treated.

Direct-seeded rows were planted 0.5 inches deep with variety UC 82 at a seeding rate of approximately one seed per inch. The plug planted rows had 60 milliliter peat-vermiculite (plus 5% carbon by dry weight) plugs spaced 10 inches apart with each plug containing approximately 6 seeds. In order to eliminate any possible advantage between planting methods resulting from too high a tomato stand being present, all plots were hand thinned to a maximum of 3 plants every 10 inches after stand counts were made. In addition to this, all plots were hand weeded to remove any weed competition.

Tomato stands were greatly reduced in the second planting as compared to the first, and this can probably be attributed to the hotter temperatures during June. Both plug and direct-seeded showed this stand reduction with the percentage reduction being greatest in the direct-seeded. Some early injury did show with the pebulate plus CDEC treatment and this was reflected in lower plant counts, but the differences were shown not to be statistically significant.

Conditions at harvest necessitated that the second planting be harvested differently than the first planting, so direct comparisons could not be made of yields between the two plantings. Yields within each planting date showed some differences although none of these were shown to be statistically significant. The only exception was that the yield of greens in the first planting was significantly greater with direct-seeding as compared to plug planting. This supports the theory that plug planting under certain conditions may shorten the time it takes to mature a tomato crop. The increase in yield (although not significant) in the second planting of the plug over the direct-seeded somewhat contradicts, but does not disprove, the idea that plug planting is somewhat risky in hot weather. (University of California Cooperative Extension, Davis, CA 95616)

Table 1:

Stand counts of processing tomatoes: plug versus direct-seeded at two planting dates

		Tomato Stand Counts1/			
		Plug		Direct	
Treatments	Ai/A	First planting	Second planting	First planting	Second Planting
A. control	-	107.8	57.5	162.0	67.3
B. pebulate + CDEC	6.0 + 6.0	92.3	44.5	137.5	62.5
C. pebulate + napropamide	6.0 + 2.0	102.5	62.7	155.3	68.0
		NS	NS	NS	NS

1/ Tomato stand counts: per 20 foot of row

Table 2:

Tomato yields: plus versus direct-seeded at two planting dates

		Reds (tons/acre)				Greens (tons/acre)			
		First planting1/		Second planting2/		First planting		Second planting	
Treatments	Ai/A	Plug	Direct	Plug	Direct	Plug	Direct	Plug	Direct
A. control	-	19.5	19.9	22.2	21.7	0.9	1.6	0.3	0.5
B. pebulate + CDEC	6.0 + 6.0	18.8	17.9	26.3	21.1	0.8	1.8	0.4	0.3
C. pebulate + napropamide	6.0 + 2.0	17.3	17.1	25.7	22.6	0.9	1.5	0.4	0.4
		NS	NS	NS	NS	NS	NS	NS	NS
Means		18.5	18.3	24.7	21.8	0.9	1.6	0.4	0.4
LSD .05		NS		NS		0.185		NS	

1/ First planting: machine harvested all 60 feet of plots on August 29, 1979; 15 to 30% of tomatoes not picked up by machine

2/ Second planting: hand harvested all 60 feet of plots on October 9, 1979; all tomatoes picked

Response of plug-mix planted tomatoes to deep incorporation of potentially useful herbicides for black nightshade control. Kempen, H. M., J. Graf and A. H. Lange. Plug-mix planting of tomatoes to reduce injury and gain control of black nightshade with normally unsafe herbicides is of much interest. There are differences in safety with plug planted tomatoes due to depth of incorporation. Those herbicides safened by plug planting are normally incorporated to 2 inches, or sprinkle incorporated. In this study, six herbicides were incorporated into pre-formed beds to 4 inches with a Johnson powered rototiller.

The plots were 40 ft. by 1 row replicated 3 times. Soil was a sandy loam. The herbicide treatments were applied with a CO_2 backpack sprayer, and after incorporation, the plots were machine plug-mix planted with an 85 ml plug, composed of Terra-lite Redi-Earth peat:vermiculite mix, 10% Gro-Safe activated charcoal and 4 to 5 variety Peto 80 tomato seeds per plug. A 11-48-1 fertilizer had been added during mixing at 13 lbs. per 30 lb. bag of Redi-Earth.

Results indicated that up to two months after planting, herbicides that are normally safe with shallow incorporation in plug-mix planted tomatoes caused injury with deep incorporation. Ethalfluralin, trifluralin, chlorpropham and oxyfluorfen each gave early injury symptoms. This occurred at low rates, as well as high rates for these herbicides. Chloramben and napropamide were safe at both rates, but since they are often used in direct seeded tomatoes, they can be considered checks. Their efficacy in controlling black nightshade is minimal, however, chlorambem may be better when not incorporated.

Black nightshade control was excellent with ethalfluralin, trifluralin, oxyfluorfen at both rates, and chlorpropham at the higher rates.

In the third month, the tomatoes showed some recovery in the chlorpropham and oxyflurofen treatments. This recovery may be due to the tomato roots outgrowing the area in which the herbicide is incorporated, or to lessened activity of the herbicides. The napropamide treatment showed increased tomato vigor reduction due to poor nightshade control. (Cooperative Extension, Univeristy of California, P.O. Box 2509, Bakersfield, Ca. 93303).

Evaluation of herbicides incorporated to 4 inches in 1979 plug-mix planted tomatoes. 1/ Arvin, Ca.

		Tomato response 2/				Black nightshade control 3/	
		Stand reduction	Vigor reduction				
Herbicide	Rate AI/A	3-23-79	3-23	4-4	5-12	3-23-79	4-4-79
Check	0	0	.4	.5	3.5	0	0
Chloramben	2	1.3	1.2	1.7	2.0	3.5	2.7
Chloramben	4	0	0.3	1.7	2.5	4.8	1.7
Ethalfluralin	2	4.2	7.2	7.3	4.3	10	10
Ethalfluralin	4	3.8	4.7	8.0	9.3	10	10
Trifluralin	.5	1.3	1.7	4.3	4.0	6.5	5
Trifluralin	1	0	1.2	4.3	4.0	6.8	6.5
Chlorpropham	2	1	4.8	6.0	2.0	10	9.8
Chlorpropham	4	0.1	2.3	6.7	2.0	10	10
Oxyfluorfen	.5	2.3	2.7	4.6	0	10	9.5
Oxyfluorfen	1	1.3	6.0	6.3	0	10	10.0
Napropamide	2	0	0.5	1.7	4.5	1.7	1.3
Napropamide	4	0.3	0.7	1.3	5.0	2.3	1.3
Chlorpropham	6	3.0	7.0	7.7	1.5	10	10
Chlorpropham	12	1.8	6.0	7.0	1.0	10	10
	LSD .05 =	2.8	2.4	1.6	3.4	2.0	1.6
	LSD .01 =	3.8	3.3	2.2	4.7	2.0	2.2

1/ Treated and planted 2/15/79; furrow irrigated. Soil type: loam. Rain 2/19 .15", 2/20 .40", 2/21 .12", 2/22 .18", 2/23 .04", 2/26 .04", 2/28 .02".
2/ Rated 0 - 10: 0 = no reduction; 10 = complete reduction.
3/ Rated 0 - 10: 0 = no control; 10 = complete control.

Comparison of eight different mixes for plug planting in processing tomatoes. Elmore, C.L., and J. Woods. This trial was established during the spring of 1979 to evaluate the effectiveness of alternate mixes (as compared to the standard peat-vermiculite mix) for plug planting in processing tomatoes. The conventional peat-vermiculite mix has proven to be an extremely effective weed management and anticrustant tool, but the high cost of the mix ($40 and up per acre) has had a limiting effect on the use of plug planting in California. A need for improving the economics of plug planting has encouraged research towards the discovery of less costly plug mixes.

Herbicides (main plots) were applied by CO_2 backpack to a Yolo clay loam on June 1, 1979 and incorporated immediately to a depth of 1.5 inches with a power tiller-bed shaper. These plots were two beds (5 feet) wide by 40 feet long and were replicated four times. Subplots (one bed by 10 feet) within these herbicide main plots consisted of eight different plot mixes, and were planted on June 8, 1979. The plugs were 60 milliliters in size and were hand-planted with corn jabbers into a fairly cloddy seedbed. The trial was furrow irrigated on June 9, 1979 and approximately every seven days thereafter.

The standard plug mix used in this trial was Terra-Lite, a 50:50 mix of peat and vermiculite. Compared to it were Solar Soil (decomposed rice hulls), Redi-Gro organic compost (partially composted fir bark), and a 50:50 combination of the rice hulls and the compost. All four of these mixes were used alone and with the addition of 5% activated carbon by weight of the Terra-Lite mix.

Evaluation of mixes as shown by tomato vigor indicate that all mixes performed fairly well except in the alachlor plots where substantial injury did occur. Rice hulls were not as effective as the compost or the peat-vermiculite mix, although the rice hulls and compost combination appeared to have a slight advantage over the rest. The addition of activated carbon improved the performance of all mixes in terms of increased tomato vigor in cases where injury did occur to the tomatoes.

Not only was the performance of these mixes in the field encouraging, but the cost data generated was especially pleasing. For example, the rice hulls-compost combination plus carbon which looked very good in this trial would cost a grower $35.00 less an acre as compared with the standard peat-vermiculite plus carbon mix. This figure is based on a 60 milliliter plug size and would be much greater for those growers using a larger plug. (University of California Cooperative Extension, Davis, CA 95616)

Table 1: Cost of plug mixes with and without activated carbon

	(1)[1/]	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Rice Hulls		Compost		Peat-Vermiculite		Rice Hulls-Compost	
	- Carbon	+ Carbon[2/]	- Carbon	+ Carbon	- Carbon	+ Carbon	- Carbon	+ Carbon
Cost/yard of mix	$ 6.50	11.70	8.95	14.15	50.60	55.80	7.73	12.93
Cost/acre[3/]	$ 5.33	9.60	7.34	11.60	41.50	45.76	6.34	10.60

1/ Plug mix treatments; corresponding numbers are used in Table 2

2/ + Carbon: 5% carbon by weight of Peat-Vermiculite mix

3/ Cost/acre: 60 milliliter plugs, 10 inches apart on 60-inch beds

Table 2:

Effect of three preplant herbicides on tomato vigor and weed control with eight plug mixes

Herbicide	Rate lb ai/A	Tomato vigor in 8 different plug mixes[1/] 1	2	3	4	5	6	7	8	Weed control[2/] Barnyard-grass	Pigweed	Common purslane
pebulate	6.0	7.5	8.0	7.5	7.8	7.0	8.8	9.2	9.0	8.5	8.8	10.0
pebulate	12.0	6.5	8.2	7.2	8.5	6.8	8.5	8.0	8.8	10.0	9.5	10.0
alachlor	3.0	6.0	5.5	6.2	6.8	6.2	7.0	7.5	8.0	10.0	9.8	10.0
alachlor	6.0	5.0	5.2	4.5	7.0	4.0	6.8	5.8	6.2	10.0	10.0	10.0
metribuzin	0.75	7.0	7.8	7.8	8.2	6.8	9.0	8.0	8.8	6.2	10.0	10.0
metribuzin	1.5	7.2	7.2	7.2	7.8	8.2	8.5	8.5	9.2	8.8	10.0	10.0
untreated	-	7.2	7.5	8.0	8.2	8.0	8.5	8.0	8.8	0.0	0.0	0.0

1/ Vigor: 10 = vigorous, 0 = no plants; rated July 3, 1979

2/ Weed Control: 10 = complete control, 0 = no control; rated July 3, 1979

Response of tomato seedling to plug planting mediums containing forest by-products. Kempen, H. M., J. Graf and A. H. Lange. Lower cost alternatives to peat-vermiculite plug planting mixtures were sought using various organic by-products. The tomato beds were prepared and treated with napropamide at 1.5 lb/Acre and pebulate at 4 lb/Acre on 3-12-79. These were incorporated with Lilliston units. Also, a pre-emergence band application of chlorpropham at 2 lb/Acre was applied and then plots were plug-mix planted using a Nasco jab planter. The 85 ml volume plugs contained 5% GroSafe activated charcoal and 2 to 4 Peto 81 tomato seeds. All components of individual mixtures had been pre-mixed using a 3/4 yard concrete mixer for 10 minutes. The tomatoes were sprinkler irrigated.

Redi-Earth (type Terra-lite) was used as the standard 50:50 peat:vermiculite plug mix. Results indicated that the best tomato seedling vigor was obtained with this standard alone, or in a combination that contained a by-product and at least 50% of the standard. Sterile or non-sterile red fir bark and white fir sawdust alone showed poorest seedling vigor.

Sterilization of plug planting medium did not appear to be necessary. However, the risk of weeds seeds, fungi, etc. makes it seem logical since the added cost (2 to 3%) is not large.

Rod McClellan & Sons of Bakersfield quotes peat:vermiculite mix at $20 per cubic yard (wholesale bulk, FOB, Bakersfield). Red fir bark is $10 per cubic yard, red fir sawdust is $7 per cubic yard, and white fir sawdust is $2 per cubic yard. Cost of Redi-Earth and Jiffy Mix (50:50 peat:vermiculite) is about $40 per cubic yard in 4 cubic feet bags. At 1.1 cubic yards/acre for single row 60 inch beds, cost could be reduced from $40/acre to about $15/A with bulk quantities of a 50:50 peat-and-vermiculite: white fir sawdust mix. (Cooperative Extension, University of California, Bakersfield, Ca. 93303).

Response of tomato seedlings to plug planting mixtures (Bakersfield, Ca)

Plug Mix Material	By volume	Tomato vigor reduction 1/ 4-9-79	4-24-79	4-30-79	5-22-79
Standard (Redi-Earth)	100	0	0.2	0.0	.5
Red fir bark + Redi-Earth	25:75	0	1.8	2.0	4.5
Red fir bark + Redi-Earth	50:50	1.1	3.2	2.8	1.3
Red fir bark	100	2.9	5.2	4.5	4.0
Red fir sawdust + Redi-Earth	50:50	0.4	1.2	1.8	.8
Red fir bark + 10% O.M. soil	90:10	2.1	6.0	5.0	2.5
Red fir bark + vermiculite	50:50	1.9	1.0	3.3	3.8
White fir sawdust + Redi-Earth	90:10	3.1	5.0	4.3	3.3
Red fir bark (NS*) + Redi-Earth	50:50	0.4	2.0	2.3	1.0
Red fir bark (NS) + Redi-Earth	90:10	2.9	5.0	4.0	2.5
Tomato mix: 25% red fir bark, 75% Redi-Earth + micronutrients	100	0.0	0.5	1.3	.5
Direct seeded		0.8	2.8	2.8	1.8
LSD .05 =		1.0	2.2	1.6	2.4

* Non sterile

1/ Average of 4 replications where 0 = no effect; 10 = complete kill, replication 4 not treated. All used 85 milliliter aliquots which contained 5% activated carbon.

Comparison of hard wafers with plug planting and direct-seeding of processing tomatoes. Elmore, C.L., and J. Woods. Plug planting of processing tomatoes has proven to be a successful weed management and anticrustant tool for many California growers. There are limitations or disadvantages, though, with this technique; one being the speed of planting (1 to 2 mph), another being the higher planting cost with this method. Because of these disadvantages, there has been interest in developing a solid plug or wafer which can be planted at a more reasonable speed (3 to 5 mph) and will still retain the protectant and anticrustant advantages of the loose plug.

During the winter of 1979 we were able to obtain a supply of Jiffy-9, No. 135 peat pellets from Jiffy Products of America. These are compressed peat wafers often used to establish greenhouse transplants for eventual production in the field. The size of these compressed pellets or wafers are 0.25 inches thick by 1.25 inches in diameter (with 0.25 inch concavity predrilled in the center to contain the seeds), and upon wetting they expand to a cylinder 1.5 inches by 1.5 inches. Half of these wafers were specially made with 5% activated carbon added by weight.

This trial was established to compare wafers with and without carbon to plug planted and direct seeded tomatoes. The three herbicides used in this trial, chlorpropham, alachlor, and pebulate, were applied and incorporated by power tiller 2 inches deep in a Yolo clay loam on April 30, 1979. The main plots (herbicide treatments) were 2 rows wide by 20 feet and contain four 10-foot long subplots (planting methods). All plots were replicated four times.

Planting was done on May 2, 1979 with VF 145-B 7879 processing tomato seed. Direct seeded tomatoes were planted 0.75 inches deep. The plugs used in this trial (60 milliliters in size) contained tomato seed and a 1:1 mix of peat and vermiculite with 5% carbon added. The top portion of this loose plug was slightly exposed at the surface of the soil. Wafers or peat pellets were placed horizontally 0.75 inches deep and were covered with loose soil. Tomato seed was fixed into the wafer concavity prior to planting with a paste of bentonite clay. The trial was furrow irrigated after planting on May 4, 1979 and approximately every 7 days thereafter.

Ratings made in this trial indicate that the conventional loose plug is more effective than the peat pellets in reducing the toxic effects of the included herbicides on the germinating tomato seedling. The peat pellets did increase the vigor and stand of the tomatoes compared to the direct seeded subplots in the chlorpropham and alachlor treatments but not as greatly as did the conventional loose plugs. The addition of carbon to the pellets did decrease the phytotoxicity to the tomatoes at the high rate of each herbicide tested.

Although the effectiveness of peat pellets was somewhat discouraging in this trial, further work with these or similar compressed pellets is indicated. One possible reason for their poor performance may have been the cloddy nature of the seedbed. This could have led to poor initial wetting, or more likely, a rapid subsequent drying of the pellet. Another question needed to be answered is whether the bentonite clay used to bind the tomato seed actually may have created its own crusting problem.
(University of California Cooperative Extension, Davis, CA 95616)

Effect of four planting methods on tomato stand and vigor with three preplant herbicides

Herbicide	Rate lb ai/A	Tomato stand[1/] planting method A	B	C	D	Tomato vigor[2/] planting method A	B	C	D	Weed control[3/] Barnyard-grass	Pigweed spp.	Hairy nightshade	Common purslane
chlorpropham	3	10.0	8.8	8.5	5.2	7.8	6.5	6.5	3.2	3.8	2.5	4.0	8.2
chlorpropham	6	9.8	8.5	8.2	4.0	9.0	6.0	5.2	2.0	4.5	4.0	5.8	8.8
alachlor	3	9.8	8.0	8.2	6.0	9.0	6.0	6.5	4.0	9.5	10.0	9.5	10.0
alachlor	6	8.8	9.0	7.2	5.2	5.8	5.2	3.8	2.5	10.0	10.0	10.0	10.0
pebulate	6	10.0	7.8	8.2	8.2	9.2	6.5	6.5	7.8	6.2	7.5	7.0	10.0
pebulate	12	10.0	9.2	8.2	8.8	9.0	7.0	5.8	6.8	9.2	9.8	9.2	10.0
check	-	10.0	9.2	9.0	9.2	7.0	6.5	6.0	6.9	0.0	0.0	0.0	0.0

Planting methods:
- A) 60 milliliter peat-vermiculite plugs with 5% carbon by weight
- B) Jiffy-9 No. 135 wafers (peat pellets) with 5% carbon by weight; 0.75 inches deep, covered
- C) Jiffy-9 No. 135 wafer without carbon; 0.75 inches deep, covered
- D) Direct seeded; 0.75 inches deep

1/ Tomato stand: 10 = complete stand, 0 = no stand; evaluated June 4, 1979
2/ Tomato vigor: 10 = vigorous, 0 = dead plants; evaluated June 4, 1979
3/ Weed control: 10 = complete control, 0 = no control; evaluated June 4, 1979

Comparison of tomato coated seed with preemergence herbicides. Agamalian, H. and A. H. Lange. This experiment was established on Salinas clay loam, a soil with 2.2% organic matter.

Seed of U.C. 82 variety was coated with activated carbon and then overcoated with Moran Seed coating. Conventional Moran Seed coating was used in comparative trial.

One seed line of each seed coating was sown in single bed plots. Each treatment was 25 ft. in length. (The seed was sown at a depth of 1 inch.) Following seeding, preemergence applications of napropamide (Devrinol) and the combinations of diphenamid (Enide) metribuzin (Sencor) and (CDEC) Vegadex were sprayed at 60 gallons per acre volume. Sprinkler irrigation was immediately applied using 1 inch of water to germinate the crop.

Evaluations were obtained in crop vigor, weed control and yield. Tomato selectivity was improved with carbon coated seed with all herbicide treatments. The increased selectivity was marginal with Sencor combinations. The increased tomato selectivity observed with Devrinol plus Enide will not enhance resistant weed control.

Further studies using this concept are worthy of continued research.

Weed control was not affected by seed coatings. All treatments resulted in 85% or better weed control. 501-425-178-27-4-79. (University of California Cooperative Extension, Salinas, California.)

TABLE 1: Tomato Herbicide Interactions with Carbon Coated Seed vs Normal Coating 501-425-178-27-4-79

		Carbon Coated Seed				Coated Seed			
HERBICIDE	LB/A	5/25 VIGOR	7/24 VIGOR	WC[a]	YIELD[b]	5/25 VIGOR	7/24 VIGOR	WC	YIELD
DEVRINOL + ENIDE	2+6	6.7	9.7	8.5	38.2	5.5	8.5	8.5	31.3
DEVRINOL + ENIDE	2+12	8.0	9.5	9.0	33.9	5.2	7.5	9.0	23.4
DEVRINOL + SENCOR	2+0.25	4.5	8.2	8.5	38.4	5.0	8.0	8.5	25.5
DEVRINOL + SENCOR	2+0.5	1.0	2.2	9.5	18.5	1.5	1.5	9.5	12.3
DEVRINOL + SENCOR	2+1	0	1.7	10.0	18.5	1.5	1.7	10.0	0
VEGADEX + SENCOR	6+0.5	0.7	2.5	9.0	12.6	1.7	2.0	9.0	20.1
ENIDE + SENCOR	6+0.5	3.2	5.7	9.5	31.3	2.2	4.0	9.5	22.8
SENCOR	1.0	2.2	3.5	10.0	14.8	1.7	2.7	10.0	9.8
CONTROL	0	8.5	9.5	2.0	34.0	6.5	8.5	2.0	27.2

a - WC = Weed control major weeds pigweed, lambsquarter, hairy nightshade

b - YIELD = Ripe fruit only tons/acre 9/22

Protection for fresh market tomato transplants with carbon in the transplant water. Lange, A. H. A trial was established on March 14, 1979 to determine the effectiveness of pebulate, chlorpropham, chloramben, metolachlor, ethalfluralin, metribuzin each at two rates and diphenamid at one rate on transplanted tomatoes. The herbicides were incorporated into the soil at a depth of 1/2 inch and about 15 minutes later they were again incorporated at a depth of 1 1/2 to 2 inches, both times with a Besiredes incorporator run at six miles per hour.

Eight replications were used; four with carbon at 2 ounces per gallon in the transplant water and four without carbon. The transplants were planted with a special sled with automatic hole placement made with a jet of water under pressure on March 15, 1979.

Weeds present in the field were redmaids, shepherd's purse, groundsel, and sowthistle. The soil was a Yettum clay loam. The irrigation method used was drip.

There were insufficient weeds present for an accurate comparison.

A vigor rating of the transplant tomatoes a little over a month after treatment and planting gernally showed little or no differences due to herbicide phytotoxicity except for chlorpropham. Activated carbon in the transplant water protected the tomatoes at the 1 lb ai/A rate and gave partial protection at the 2 lb ai/A rate. Part of the lack of phytotoxicity may have been due to the use of transplants and the shallow incorporation. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

The effect of carbon in the transplant water
on the phytotoxicity of seven herbicides

Herbicides	lb/A	Carbon 1/	No Carbon	Average 2/ Rating
Pebulate	4	8.0	7.0	7.5
Pebulate	8	6.2	6.0	6.1
Chlorpropham	1	9.2	7.5	8.4
Chlorpropham	2	7.2	6.2	6.8
Chloramben	1	9.5	9.5	9.5
Chloramben	2	9.0	8.2	8.6
Metolachlor	1	8.8	9.2	9.0
Metolachlor	2	8.5	9.0	8.8
Ethalfluralin	1	8.2	9.5	8.9
Ethalfluralin	2	8.0	7.2	7.6
Diphenamid	4	9.0	9.5	9.3
Metribuzin	1/4	9.8	9.8	9.8
Metribuzin	1/2	9.5	9.8	9.6
Check	-	9.2	9.8	9.5

1/ Carbon was 2 ounces of carbon per gallon in the transplant water.
2/ Average of 8 replications.

The effect of winter bed preparation and treatment on spring weed control and tomato stand. Schlesselman, J. T. and A. H. Lange. Metribuzin has been registered for fall application on fall pre-formed beds. This herbicide is known to have a significant residual activity and a narrow margin of safety on tomatoes. The objective of this trial was to evaluate winter treatment and spring residual activity on tomatoes and weeds.

The herbicides were applied January 3, 1979 over a five foot pre-formed tomato bed. This was late for this type of treatment, but a conservative answer was part of the objectives.

The first seeding was made March 17, 1979 and resulted in very little crop information because of crusting problems. The second seeding was made April 27, 1979.

Weed control was outstanding at all rates and in all combinations. Lower rates of metribuzin should be evaluated in combination with the three herbicides in the test.

The 2 and 4 lb ai/A metribuzin rates were still showing injury to direct seeded tomatoes. The 1 lb ai/A rate alone or in combination was well worth it.

The effect of winter bed preparation and treatment on spring weed control and tomato vigor

Herbicides	lb/A	Average 1/ Barnyard-grass	Pigweed	Lambs-quarters	Tomato Vigor
Metribuzin	1/2	6.8	8.5	10.0	7.0
Metribuzin	1	7.0	10.0	10.0	8.2
Metribuzin	2	9.8	10.0	10.0	4.2
Metribuzin	4	10.0	10.0	10.0	2.8
Metribuzin+Chlorpropham	1+4	9.0	10.0	10.0	7.0
Metribuzin+Chlorpropham	1+8	7.8	10.0	10.0	5.8
Metribuzin+Diphenamid	1+4	8.5	9.8	9.8	8.8
Metribuzin+Diphenamid	1+8	7.2	10.0	10.0	7.8
Metribuzin+Chloramben	1+4	7.2	10.0	10.0	8.0
Metribuzin+Chloramben	1+8	8.5	10.0	10.0	6.2
Check	-	2.5	2.5	0.0	6.2

1/ Average of 4 replications where 0 = no effect and 10 = best weed control and most vigorous plants. Treated 1/3/79. Evaluated 5/29/79.

(University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

The interactions of three planting systems with several tomato herbicides. Agamalian, H., D. Wilkins and A. H. Lange. The trial was established on a Lockwood silty clay loam with 1.35% organic matter. One of the herbicides Tillam (pebulate) was applied as a preplant incorporated treatment. Incroporation depth was 3 inches.

Following bedshaping the tomatoes were seeded with three planting methods. The plug planter was used with a 50% Vermiculite and 50% peat moss mixture, plus 5% of the activated carbon. The second planting system was the Stanhay planter with coated seed, using a carbon hydrogel mixture. This slurry was sprayed over the seed and allowed to flow to the soil surface. The third planting system was coated seeds planted with the Stanhay planter.

After seeding, amiben, metribuzzin, chloroproham, napropamide, and diphenamid were sprayed as preemergence treatments. The experiment was designed as a complete ranomized block. All treatments were one bed, (5 ft. by 25 ft. in length). The experiment was grown under sprinkler irrigation. Initial irrigation was one inch of water. Approximately 2.5 inches of water was required to obtain maximum tomato stand.

The two selective tomato treatments (1) Tillam, and (2) Devrinol + Enide resulted in acceptable tomato stands regardless of planting system. Sencor and Furloe provided reasonable crop selectively only with the plug planter system. Amiben treatments resulted in acceptable stand development, but yield data was poor when compared to the commercial standard.

In comparing treatments with the plug planter, Sencor and Furloe resulted in comparable yields to the weeded control. But the standard Devrinol + Enide was the highest yielding treatment.

Weed control in all three planting systems was evaluated on yellow nutsedge, hairy nightshade, and red rooted pigweed. Weed control data were reasonably consistant between planting systems. Tillam and Sencor were effective on nutsedge, pigweed, and hairy nightshade, Furloe was effective on hairy nightshade and pigweed, but did not control yellow nutsedge. The combination of Devrinol + Enide gave only acceptable weed control on pigweed.

Although the plug planter greatly increased the selectivity of Furloe, Sencor, Tillam, and Amiben, the margin of selectivity was limited. It would appear that the selectivity must be increased in order to obtain greater crop safety. 501-425-187-27-2-79. (Univeristy of California Cooperative Extension, Salinas, California).

TABLE 1: The interaction of three planting systems with several tomato herbicides.

501-425-187-27-2-79

PLUG PLANTER

HERBICIDE	LB/A	5/11 STAND COUNT	5/25 CROP PHYTO	7/25 CROP VIGOR	WEED CONTROL 5/25 HNS	PW	YNS	9/19 CROP YIELD RED'S ONLY T/A
TILLAM	6	42.5	2.5	8.2	8.7	8.8	9.2	21.1
AMIBEN	4	21.5	7.5	7.0	9.2	10.0	4.0	16.0
SENCOR	1	22.8	7.0	7.2	10.0	10.0	9.5	26.3
FURLOE	4	25.0	5.0	8.2	10.0	8.2	2.5	24.0
DEVRINOL + ENIDE	2+6	44.0	1.2	9.7	2.7	10.0	4.2	33.5
CONTROL	0	30.8	2.5	8.5	1.7	4.5	4.2	26.0

STANHAY PLANTER COATED SEED

HERBICIDE	LB/A	STAND COUNT	CROP PHYTO	CROP VIGOR	WEED CONTROL HNS	PW	YNS	CROP YIELD RED'S ONLY T/A
TILLAM	6	84.5	3.0	8.2	8.0	3.5	8.5	16.8
AMIBEN	4	36.5	6.1	6.2	8.7	10.0	3.5	17.7
SENCOR	1	6.0	9.7	1.0	10.0	10.0	9.2	9.0
FURLOE	4	2.5	9.7	0	9.8	8.2	3.0	0
DEV + ENIDE	2+6	34.0	6.5	8.2	3.5	10.0	4.0	20.1
CONTROL	0	42.5	2.5	5.2	0	2.2	2.2	8.4

STAND COUNT/25

PLANTER: STANHAY + CARBON

HERBICIDE	LB/A	STAND COUNT	CROP PHYTO	CROP VIGOR	WEED CONTROL HNS	PW	YNS	CROP YIELD RED'S ONLY T/A
TILLAM	6	60.5	2.1	8.2	4	7.0	7.8	21.1
AMIBEN	4	32.5	8.0	5.0	9.8	10.0	8.0	16.0
SENCOR	1	5.0	10.0	0	10.0	10.0	10.0	26.3
FURLOE	4	8.0	8.7	1.5	10.0	7.2	3.8	24.0
DEV.+ENIDE	2+6	59.0	3.7	7.0	3.0	10.0	2.5	33.5
CONTROL	0	30.5	4.2	4.2	1.2	1.0	2.8	26.0

HNS = hairy nightshade PW = pigweed YNS = yellow nutsedge T/A = tons/acre

The effect of three planting methods and herbicides on UC 82 tomatoes. Lange, A. H. and J. T. Schlesselman. The Delhi loamy sand was tilled March 30, 1979, bedded up and planted with UC 82 seed, standard plug mix and pre-germinated UC 82 seed in Viterra gel (100 gms/L and covered with 85 cc of standard plug mix including 5% carbon, mag. amp. and Viterra 2). The herbicides were sprayed on the entire five foot bed top and sprinkler irrigated March 31, 1979 for two hours.

The ratings made on April 15, 1979, May 1, 1979 and May 8, 1979 indicated that both plug forms gave excellent protection when compared to the direct seeding. The standard plugging method gave better stand and vigor in the early ratings. The effect of the high rates of herbicides were protected against by the standard plug only. The gel plug gave some safety over direct seeded. The high fresh weight for the low rate of chlorpropham was probably due to superior weed control and little or no phytotoxicity. The heavier weights for napropamide also reflect the same weed problem. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

Table 1. The effect of three herbicides on weed control and tomato vigor using three types of planting

Herbicides	lb/A	Average 1/ Direct Seeded	Gel Plug	Plug	Weed Control 2/
Chloramben	4	3.6	6.0	7.6	9.8
Chloramben	8	1.8	4.2	7.0	9.6
Chlorpropham	4	0.0	4.2	8.2	9.8
Chlorpropham	8	0.0	3.0	7.4	10.0
Napropamide	1	5.8	8.6	9.8	7.8
Check	-	7.2	8.8	9.2	1.2

1/ Average of 5 replications where 0 = no plants, no effect on weeds and 10 = most vigorous and best stand, complete weed control. Treated 3/31/79. Evaluated 5/1/79. Soil is a Delhi loamy sand. Herbicides were incorporated 3/31/79 by sprinkler twice a week with 0.2 acre inches per irrigation.

2/ Weeds mainly bursage.

Table 2. The effect of three preemergence herbicides on the top growth of processing tomatoes

		Average 1/					
		Number of Plants 2/			Weight (Grams) 2/		
Herbicides	lb/A	Direct Seeded 3/	Gel Plug	Plug	Direct Seeded 3/	Gel Plug	Plug
Chloramben	4	53.2	15.0	8.2	34.2	53.2	44.2
Chlroamben	8	31.4	5.4	14.0	11.7	18.5	64.7
Chlorpropham	4	0.0	8.2	14.8	0.0	30.1	123.8
Chlorpropham	8	0.0	5.4	10.0	0.0	13.1	57.0
Napropamide	1	55.2	19.6	11.8	84.3	73.7	91.4
Check	-	53.6	22.4	10.2	73.7	85.4	67.2

1/ Average of 5 replications. Evaluated 5/17/79.

2/ Number and weight of plants per 5 feet or row.

3/ The direct seeded crop was seeded 1 inch apart, plugs 10 inches apart.

A comparison of blade vs. power incorporation of pebulate and metolachlor for nutsedge control. Lange, A. H. and P. Osterli. A heavy nutsedge (yellow) infested tomato field southwest of Crow's Landing was abandoned by the grower. The soil was a clay loam with small clods. The area was power tilled with a tractor mounted Howard rototiller on May 18, 1979. Herbicides were applied May 22, 1979 with blade. Another set was surface applied and incorporated to a depth of five inches. The plots were 5 by 60 feet replicated four times. They were also plug planted and direct seeded May 22, 1979 but because of inadequate irrigation only the plug planting survived.

The first evaluation (June 19, 1979) dramatically emphasized the superior nutsedge control with bade application of pebulate over power incorporation. Both evaluations demonstrated the superior nutsedge control with metolachlor even at half the rate of pebulate. In this trial, hairy nightshade control was also better with metolachlor than with pebulate. The residual nutsedge control two months after treatment with metolachlor was strikingly superior to pebulate. The incorporated metolachlor was more selective giving better nutsedge and nightshade control and better tomato vigor. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

Table 1. The effect of the method of herbicide incorporation on the control of yellow nutsedge in processing tomatoes

		Average 1/	
Herbicides	lb/A	Mechanical Incorporation	Blade Incorporation
Pebulate	4	4.0	8.5
Pebulate	8	6.5	8.0
Metolachlor	2	9.5	9.2
Metolachlor	4	10.0	9.2
Check	-	1.2	2.8

1/ Average of 4 replications where 0 = no effect and 10 = complete control. Treated May 18, 1979. Evaluated June 19, 1979.

Table 2. The effect of incorporation method on the control of nutsedge and nightshade in tomatoes

			Average 1/		
Herbicides	lb/A	Method	Nutsedge Control	Hairy Nightshade Control	Tomato Vigor
Pebulate	4	Inc.	1.2	4.2	6.2
Pebulate	8	Inc.	2.8	6.2	8.2
Pebulate	4	Blade	4.5	7.2	7.8
Pebulate	8	Blade	3.2	7.2	6.5
Metolachlor	2	Inc.	9.8	9.7	7.8
Metolachlor	4	Inc.	10.0	9.2	7.0
Metolachlor	2	Blade	8.2	9.0	5.0
Metolachlor	4	Blade	8.8	2.0	4.5
Check	-	Inc.	0.5	2.0	4.5
Check	-	Blade	0.0	6.0	6.2

1/ Average of 4 replications where 0 = no effect, no stand and 10 = best control, best stand and vigor. Treated May 18, 1979. Evaluated July 11, 1979.

Sprinkler vs. mechanical incorporation of five herbicides for hairy nightshade control in plug planted tomatoes. Bendixen, W. E., A. H. Lange, L. J. Nygren and J. T. Schlesselman. A trial was established on May 2, 1979 in an attempt to determine the activity of five herbicides applied alone and in combination when incorporated either mechanically or with sprinklers. The herbicides were applied to 30 by 5 foot plots and replicated six times for each treatment in the heavy clay soil consisting of 15,4% sand, 20.3% silt, 64.3% clay and 1.8% organic matter. Three of the replications were then tilled to a depth of 2 1/2 to 4 inches. The herbicides were left on the soil surface with the remaining three replications. All plots were then plug planted with the standard plug mix containing UC 82 processing tomato seed. The entire experiment was then uniformly sprinkler irrigated the same day, totalling 1 1/2 inches of water.

The first evaluation made after three weeks showed some herbicide treatments to be about equally active whether sprinkler or mechanically incorporated. These included the combination of pebulate plus napropamide, pebulate plus metribuzin, chlorpropham plus metribuzin and metribuzin by itself.

Some treatments were safer on tomatoes if mechanically incorporated but still were more active against nightshade. These included the combinations of chloramben plus napropamide and chloramben plus metribuzin.

The combination of chlorpropham plus napropamide, as well as chlorpropham alone resulted in the best hairy nightshade control and the safest on the plug planted tomatoes when sprinkler incorporated.

All treatments except chlorpropham alone gave excellent weed control activity regardless of incorporation method. Chlorpropham also showed little difference in activity whether mechanically or sprinkler incorporated, but its overall control was only marginally acceptable.

By the time five weeds had passed since herbicide application, most treatments were responding similarly to their activity two weeks earlier. There was, however, a slight reduction in tomato vigor with some of the treatments.

With the exception of chlorpropham by itself, most treatments were still giving excellent pigweed and barnyardgrass control at five weeks. There was also little difference in the treatments whether they were incorporated mechanically or by sprinklers. One exception was with chloramben, which gave much better barnyardgrass control when it was sprinkler incorporated.

The final tomato vigor rating was taken on June 24, 1979, 7 1/2 weeks after the trial was established. Some treatments were still showing excellent tomato vigor without much difference as to incorporation method. These included the combinations of pebulate plus napropamide, pebulate plus metribuzin, as well as metribuzin alone. The combination of chloramben plus napropamide resulted in excellent tomato vigor when it was mechanically incorporated.

The results of this study showed the best treatment for controlling hairy nightshade as well as other annual weeds, without affecting plug-planted tomato vigor, was the combination of pebulate plus metribuzin. There was also little difference in how this treatment was incorporated. However, there was a slight, but consistent increase in tomato safety with mechanical incorporation of the herbicides. (University of California, Cooperative Extension, P. O. Box 697, Santa Maria, CA 93456)

The effect of incorporation method
for plug planted tomatoes and nightshade control

Herbicides	lb/A	Average[1/] Tomato Vigor Pre	PPI	Nightshade Control Pre	PPI
Pebulate+Napropamide	4+2	8.3	8.3	9.3	9.0
Chloramben+Napropamide	4+2	5.0	8.0	7.7	9.7
Chlorpropham+Napropamide	2+2	6.7	4.7	8.7	8.0
Pebulate+Metribuzin	4+1/2	8.7	10.0	10.0	10.0
Chloramben+Metribuzin	4+1/2	5.3	8.0	9.3	10.0
Chlorpropham+Metribuzin	2+1/2	5.7	4.7	9.7	9.3
Metribuzin	1/2	7.0	8.3	7.7	9.7
Chloramben	4	6.7	8.3	9.7	8.0
Chlorpropham	2	9.7	5.3	9.0	7.3
Check	-	9.0	9.3	0.0	0.7

1/ Average of 3 replications where 0 = no effect, no stand and 10 = complete control, best stand. Treated 5/2/79. Evaluated 5/24/79.

The effect of initial irrigation on the activity of three preemergence herbicides. Bendixen, W. E., A. H. Lange, L. J. Nygren and J. T. Schlesselman. Previous studies have shown the amount of initial irrigation immediately following herbicide application can play an important role in the activity of some herbicides. With certain herbicides there is an optimum level of initial irrigation necessary to obtain the maximum herbicide activity.

A trial was established on June 1, 1979 in Los Alamos, Santa Barbara County by applying chloramben at 4 lb ai/A, chlorpropham at 4 lb ai/A and pebulate at 8 lb ai/A. These herbicides were replicated nine times on 5 by 5 foot plots in this loam soil (58.5% sand, 32.0% silt, 9.5% clay and 0.87% organic matter).

Immediately following herbicide application, a rain simulator was used to apply 1/3 inch, 1 inch and 3 inches of water utilizing three replications for each initial irrigation level. No further water was applied to the plots for two weeks.

A weed control rating was taken on June 13, 1979 as a result of weeds germinating in the plots receiving one inch and three inches initial irrigation. Very few weeds germinated in the check plots receiving one-third inch of water, indicating this was an insufficient amount of water to germinate the weed seeds. Chloramben was the only herbicide to show a significant reduction in activity with three inches of initial irrigation compared to the activity at the one inch level. This indicated that chloramben may have been diluted out of the weed germination zone with three inches of initial irrigation.

On June 14, 1979 all plots were seeded with milo, beans, sugar beets, tomatoes, cantaloupe and white clover. All plots were then uniformly sprinkler irrigated to bring up the crops.

The best activity with chloramben was obtained with only one-third inch of initial irrigation. Chlropropham was quite active on milo, beans and tomatoes, regardless of initial irrigation level. Chlorpropham's activity on sugar beets was reduced when three inches of initial irrigation was applied. Clover showed almost complete tolerance, to most herbicides including chlorpropham, regardless of initial irrigation level. Pebulate was only active on milo, with no difference as to level of initial irrigation.

The results of this study suggested that chloramben was affected more by initial irrigation level than either chlorpropham or pebulate. The irrigation level resulting in the best chloramben activity was at one-third inch. (University of California, Cooperative Extension, P. O. Box 697, Santa Maria, CA 93456)

Comparison of three preemergence herbicides
with varying levels of initial irrigation

		Crop Vigor 1/					
			Milo			Bean	
Herbicides	lb/A	1/3"	1"	3"	1/3"	1"	3"
Chloramben	4	0.0	5.7	10.0	8.3	9.0	10.0
Chlorpropham	4	3.0	1.3	1.3	6.0	4.0	3.0
Pebulate	8	0.3	0.7	1.3	10.0	10.0	10.0
Check	-	10.0	10.0	10.0	10.0	10.0	10.0

			Tomato			Sugar Beet	
Herbicides	lb/A	1/3"	1"	3"	1/3"	1"	3"
Chloramben	4	7.0	10.0	10.0	0.0	4.7	10.0
Chlorpropham	4	4.0	1.0	3.7	6.7	4.3	7.3
Pebulate	8	10.0	10.0	10.0	10.0	10.0	10.0
Check	-	10.0	10.0	10.0	10.0	10.0	10.0

			Clover			Hairy Nightshade Control 2/	
Herbicides	lb/A	1/3"	1"	3"	1/3"	1"	3"
Chloramben	4	6.0	9.7	10.0	10.0	6.7	2.0
Chlorpropham	4	8.0	5.7	9.3	8.3	10.0	9.3
Pebulate	8	9.7	9.3	9.0	8.0	10.0	8.7
Check	-	10.0	10.0	10.0	0.0	0.0	0.0

1/ Average of 3 replications where 0 = no vigor or stand and 10 = most vigorously growing plants.

2/ Average of 3 replications where 0 = no effect and 10 = complete weed control. Treated June 1, 1979. Seeded June 14, 1979. Evaluated July 6, 1979.

Screening new herbicides for preemergence weed control in cantaloupes. Lange, A. H. and J. T. Schlesselman. In order to simulate a wider range of conditions relative to phytotoxicity and to learn more about plug planting in melons, herbicides were evaluated at a use rate known to control weeds and two to four times this rate. Herbicides were applied to prepared 40 inch beds, two beds per plot. One of these beds was direct seeded and the other was plug planted. After rating the stand and vigor, the direct seeded bed was split out in order to give the standard 80 inch bed. Five spots in each plot were hand planted with pregerminated seed in gel and covered by hand with the same amount of plug material. The timing of this planting was poor and the roots may have been damaged so gel-plug planting was too poor to properly evaluate. The standard plug showed no advantage where napropamide had been incorporated fairly deep (three inches) with a Taylor incorporator. Several herbicides were protected against by the carbon impregnated plug. These were NC 20484, AC 213975 and ethalfluralin. The plugs did not appear to be important with napropamide, Ortho 28269, UBI S-734, MBR 18337, Dowco 295 or PPG 225.

Before the direct seeded beds were split out, five foot sections of each plot were pulled and weighed. The largest recorded was from a low rate of ethalfluralin ie., 1 lb ai/A. The herbicide did not demonstrate a 4X safety factor, however. The results from napropamide treated plots were erratic but thinning weights may have been less than naptalam plus bensulide or the untreated check. Yield appeared down from the best treatments. The Ortho 28269 that looked good in the early ratings appeared to display some phytotoxicity whereas AC 213975 and Dowco 295 appeared to be the safest of the new compounds from the thinning weights.

The fruit weight taken from the napropamide plots only showed little if any reduced yield even at the 4 lb ai/A rate.

The later evaluation seemed to show a vigor advantage in favor of plug planting with most herbicides.

Pigweed was controlled by most herbicides in this test with exceptions of NC 20484, UBI S-734 and MBR 18337. The considerably better weed control on the direct seeded beds may be due to the knocking-off precedure, ie., when the caps are knocked off the direct seeded beds only. (University of California, Cooperative Extension, 9240 South Riverbend Ave., Parlier, CA 93648)

The effect of preplant incorporated herbicides on plug and direct seeded PMR 45 cantaloupes

Herbicides	lb/A	Plug 1/	Average Direct Seeded 1/	Fresh Weight 2/	Pigweed Control 3/
Naptalam+Bensulide	2+4	0.0	1.0	18.9	8.6
Napropamide	1	4.2	3.5	12.4	9.4
Napropamide	2	6.0	6.2	6.6	9.6
Napropamide	4	4.5	5.0	14.6	8.5
Napropamide+Naptalam	2+4	6.0	5.2	5.0	10.0
Napropamide+Naptalam	2+4	4.8	5.8	11.0	9.6
NC 20484	1/2	0.5	2.2	8.3	4.0
NC 20484	2	3.5	8.2	0.0	6.0
AC 213975	1	2.2	9.0	21.1	10.0
AC 213975	2	5.2	9.8	20.1	10.0
Ortho 28269	1/2	0.0	0.2	12.1	8.5
Ortho 28269	2	3.5	3.5	8.0	9.5
UBI S-734	1/4	0.5	0.0	14.6	6.0
UBI S-734	1	0.8	0.8	16.3	7.0
Ethalfluralin	1	4.2	8.8	32.7	10.0
Ethalfluralin	4	5.0	10.0	0.0	10.0
MBR 18337	1	1.5	1.2	14.9	7.1
MBR 18337	4	2.2	3.8	12.7	6.3
Dowco 295	1	2.5	2.0	13.6	6.2
Dowco 295	4	0.0	2.5	18.4	8.8
PPG 225	1	9.2	10.0	10.6	10.0
Check	-	2.5	0.5	16.8	3.5

1/ Average of 4 replications where 0 = no effect and 10 = complete kill. Treated 4/13/79. Evaluated 5/4/79.

2/ Average of 4 replications. Weights and counts taken from a 5 foot section of each plot. Weights measured in grams.

3/ Average of 4 replications where 0 = no effect and 10 = complete control. Treated 4/13/79. Evaluated 5/30/79.

Annual weed control in desert cantaloupes. Cudney, D., K. Mayberry, and A. H. Lange. Early melons are usually planted into dry soil and irrigated for best stands. This often leads to heavy weed problems. The object of this work was to evaluate preemergence herbicides for annual weed control in PMR 45 cantaloupes.

Because incorporation on slanted beds (used for early melons) is difficult with power equipment and because shallow incorporation is preferred for most herbicides, Lilliston incorporation was used in both flat and slanted beds. Three 45° slanted beds and four flat beds were prepared prior to February 15, 1979. The herbicides were applied in a 20 inch band on 42 inch beds. Each plot was 20 feet long. Each treatment was replicated three times on slanted beds and four times on flat beds. The herbicides were applied with a constant CO_2 sprayed in 21 gpa of water. There was a slight breeze by completion.

The three slanted beds were plug planted with premixed dry seed in a standard 50:50 peat-vermiculite plug mix with activated carbon (5%) and preplant fertilizer. The four flat beds were direct seeded and simulated gel-plug. Activated carbon was mixed with the gel at 5% by weight. Activated carbon was also mixed with a 50:50 peat-vermiculite mix with fertilizer added. The pregerminated PMR 45 melon seed was spooned into each hole (dug with hoe) and covered with 85 cc of standard plug mix.

The results showed a consistent advantage to the early stand and strikingly increased safety on slanted beds with particularly toxic herbicides, but chlorpropham did not show as much injury on flat beds which may have to do with depth of incorporation or some other variable like later germination and, therefore, lower levels of the herbicides on the cooler flat beds. (University of California, Cooperative Extension, Plant Sciences Building, Riverside, CA 95616)

Table 1. The effect of Lilliston incorporated herbicides on the vigor of PMR 45 cantaloupe plants planted with four different methods

Herbicides	lb/A	Average[1/] Direct Seed Slanted Bed Vigor	Plug Planted Slanted Bed Vigor	Direct Seed Flat Bed Vigor	Plug Gel Flat Bed Vigor
Bensulide	6	6.0	8.3	6.5	8.0
Naptalam	4	8.0	8.7	5.0	5.5
Naptalam	8	7.0	8.7	5.5	6.5
Napropamide	2	9.7	7.3	5.5	6.0
Napropamide	4	5.0	6.7	5.5	6.0
Chlorpropham	4	1.0	5.7	5.0	6.0
Chlorpropham	8	0.7	7.3	6.5	7.5
MBR 18337	1	6.3	8.3	1.0	4.0
MBR 18337	2	7.7	8.7	3.5	0.5
Chloramben	4	5.7	8.0	4.5	5.5
Chloramben	8	7.7	8.0	3.0	4.0
Napropamide+Naptalam	2+4	7.0	8.0	5.5	6.0
Bensulide+Naptalam	6+4	5.3	6.7	7.5	9.0
Check	-	6.3	8.0	0.5[2/]	5.0

1/ Average of 2 to 3 replications where 0 = no stand and 10 = best stand. Treated 2/15/79. Evaluated 3/9/79.
2/ Due to severe weed competition.

Table 2. The effect of Lilliston incorporated herbicides on weed control

Herbicides	lb/A	Weed Control[1/] Slanted Bed	Flat Bed	Average
Bensulide	6	8.0	7.3	7.7
Naptalam	4	5.0	5.3	5.2
Naptalam	8	6.0	6.0	6.0
Napropamide	2	6.3	5.8	6.1
Napropamide	4	1.7	5.8	3.8
Chlorpropham	4	6.0	5.5	5.8
Chlorpropham	8	6.7	7.0	5.9
MBR 18337	1	2.0	2.5	2.3
MBR 18337	2	1.7	2.0	1.9
Chloramben	4	1.3	5.0	3.2
Chloramben	8	2.3	3.5	2.9
Napropamide+Naptalam	2+4	6.0	5.8	5.9
Bensulide+Naptalam	6+4	10.0	8.3	9.2
Check	-	2.0	2.8	2.4

1/ Average of 2 to 3 replications where 0 = no effect and 10 = all plants dead. Treated 2/15/79. Evaluated 3/9/79.

An evaluation of preplant incorporated herbicides on Honeydew and Crenshaw melons. Elmore, C.L. and J. Woods. Preplant incorporated herbicides were evaluated with two melon varieties, Green Flesh Honeydew and Golden Crenshaw, on a Yolo clay loam soil (U.C. Davis campus). Herbicides were applied by CO_2 backpack on May 14, 1979, and were incorporated twice (1.5 inches deep) with Lilliston rolling cultivators immediately after application. The plots were 20 feet long by 5 feet wide (1 bed) and each treatment was replicated 4 times. The two melon varieties were planted May 17, 1979 to a depth of 1.5 inches with the seedlines being 14 inches apart in the center of the bedtop. Sprinkler irrigation was begun on May 21, 1979 (1 inch of water) and continued for the next three irrigations. The trial was then furrow irrigated from June 23, 1979 until completion. All weeds were removed from the weeded controls on June 9, 1979, and all plots except the unweeded controls were weeded June 20, 1979.

Napropamide was the only herbicide that showed adequate safety in this trial. No melon vigor reduction was noted, although a slight stand reduction occurred at 2 lb ai/A. Alachlor, metolachlor, and the 1 lb ai/A rate of trifluralin all showed a definite vigor reduction, and injury from these materials also was evidenced in lower stand counts .

Although napropamide was fairly safe on the melons, it gave poor control of pigweed spp. and lambsquarters, and only adequate control of barnyardgrass. Trifluralin at 1 lb ai/A looked good on all three weed species, only being surpassed by the excellent control with alachlor at 4 lb ai/A. Metolachlor was somewhat weak on lambsquarters.
(University of California Cooperative Extension, Davis, CA 95616)

Weed control and injury with preplant incorporated herbicides
in Honeydew and Crenshaw melons

Herbicide	Rate lb ai/A	Vigor[1/]		Stand counts[2/]		Weed control[3/]		
		Honeydew	Crenshaw	Honeydew	Crenshaw	P.W.	B.G.	L.Q.
napropamide	1.0	9.0	9.0	18.25	12.50	4.0	7.5	4.2
napropamide	2.0	8.8	8.8	9.25	12.25	5.2	8.2	5.0
trifluralin	0.5	9.0	8.2	13.25	6.50	6.0	8.5	7.0
trifluralin	1.0	6.0	3.5	7.00	2.50	8.8	9.8	9.2
alachlor	2.0	5.5	5.0	10.00	5.50	9.0	9.8	7.2
alachlor	4.0	3.8	3.8	4.00	4.00	10.0	10.0	9.5
metolachlor	2.0	6.8	6.2	10.75	6.50	8.0	10.0	6.2
metolachlor	4.0	5.8	4.5	9.75	5.20	9.8	10.0	6.5
weeded	-	9.0	8.5	13.50	15.00	10.0	10.0	10.0
unweeded	-	9.0	9.0	8.25	9.50	0.0	0.0	1.0
$LSD_{.05}$				6.973	6.218			

1/ Vigor: 10 = vigorous, 0 = dead; evaluated June 10, 1978
2/ Stand counts per 15 feet of row taken July 3, 1979

3/ Weed control: 10 = complete control, 0 = no control; evaluated June 10, 1979

P.W. = pigweed spp.
B.G. = barnyardgrass
L.Q. = lambsquarters

Weed control and crop tolerance with preemergence herbicides in Honeydew and Crenshaw melons. Elmore, C.L. and J. Woods. This trial was established on the U.C. Davis campus (Yolo clay loam soil) to evaluate preemergence herbicides in a side-by-side comparison of Honeydew and Crenshaw melons. The melon varieties (Honeydew Green Flesh and Golden Crenshaw) were planted May 17, 1979 (1.5 inches deep) 14 inches apart on the center of 5 foot beds. Plots were one bed wide by 20 feet long, and were replicated 4 times. Herbicides were applied on May 21, 1979 by CO_2 backpack and were sprinkled in (1 inch of water) later that day. Three subsequent sprinkler irrigations followed before the trial was switched over to furrow irrigation.

Melon vigor and weed control was rated on June 10, 1979 and vigor was again rated on June 26, 1979. Weeds were removed from the weeded control on June 22, 1979, and the remainder of the plots (with the exception of the unweeded control) were weeded on June 26, 1979. Stand counts of both melon varieties were made on June 28, 1979, and then the Crenshaws were removed (fresh weights taken) to allow for the eventual harvesting of the Honeydew melons on September 10, 1979. On June 29, 1979 ammonium sulfate (126 pounds N) was sidedressed on both sides of the Honeydew drill row.

Results in this trial indicate a substantial stand reduction and vigor loss from the use of nitrofen in melons. This injury appeared to be greater with the Crenshaw variety than with Honeydew. Stand and vigor with other herbicides did not appear to differ greatly from the control except in those treatments that failed to control the weeds adequately.

Weed species rated in this trial include lambsquarters, barnyardgrass and pigweed spp. Excellent control was attained with chloramben on these species. This is in line with results attained from other trials where chloramben was followed by a light sprinkler irrigation. Poor weed control was attained when napropamide or diclofop was used alone.

Fresh plant weights of Crenshaws reflected more the effect of inadequate weed control rather than the phytotoxicity of the herbicides. Chloramben plots had the highest plant weights which corresponded with exhibiting the best weed control. This relationship between fresh weight and weed control showed in all treatments except those with nitrofen. The phytotoxicity of nitrofen itself was apparently enough to reduce the Crenshaw fresh weights.

The greatest yield reduction of Honeydew melons occurred in those treatments where weeds were not controlled (napropamide and diclofop) or where nitrofen at 4 lb ai/A was included. Yield in the unweeded control was only about 15 per cent of the yield obtained in clean plots.
(University of California Cooperative Extension, Davis, CA 95616)

Table 1: Weed control and injury with preemergence herbicides in Crenshaw and Honeydew melons

Herbicide	Rate lb ai/A	Vigor[1/] Crenshaw 6/10	Vigor[1/] Crenshaw 6/26	Vigor[1/] Honeydew 6/10	Vigor[1/] Honeydew 6/26	Stand counts[2/] Crenshaw	Stand counts[2/] Honeydew	Weed control[3/] P.W. 6/10	Weed control[3/] B.G. 6/10	Weed control[3/] L.Q. 6/10
napropamide	2	8.5	5.8	8.2	6.5	14.8	14.0	2.0	3.2	5.8
napropamide	4	8.0	6.5	8.5	7.5	13.5	27.0	4.2	8.0	7.2
diclofop	2	9.2	5.5	9.0	6.5	13.5	17.0	1.2	8.0	5.2
naptalam	6	8.0	8.0	7.2	7.8	17.2	19.5	8.0	8.2	7.5
chloramben	3	9.0	8.5	9.0	9.0	18.0	22.2	10.0	9.6	10.0
chloramben	6	8.0	8.2	7.2	8.8	17.8	20.2	10.0	9.8	10.0
nitrofen	2	4.5	5.2	6.5	7.8	7.2	17.2	9.0	7.2	8.8
nitrofen	4	4.0	4.5	5.2	6.0	6.0	11.8	10.0	8.0	9.0
napropamide + naptalam	1 + 3	7.2	7.5	8.5	7.5	14.5	17.8	7.8	9.0	8.2
naptalam + bensulide	3 + 3	8.2	7.2	8.2	7.8	13.0	20.8	8.0	8.5	8.0
naptalam + diclofop	3 + 2	8.2	7.8	8.5	8.0	18.5	22.5	6.0	9.5	8.0
naptalam + diclofop	6 + 2	7.8	7.2	7.8	7.8	11.2	16.8	6.0	10.0	7.0
napropamide + nitrofen	1 + 4	4.2	4.2	4.5	5.2	6.5	9.5	10.0	9.6	8.8
weeded control (hoed June 22, 1979)	-	9.0	5.0	9.0	6.2	15.8	14.5	0.5	1.0	1.0
unweeded control	-	9.8	5.8	9.5	6.8	14.5	14.5	0.8	0.2	0.5
LSD .05						6.572	8.203			

1/ Vigor: 10 = vigorous; 0 = no vigor
2/ Stand counts taken per 15 feet of row on June 28, 1979
3/ Weed control: 10 = complete control; 0 = no control

P.W. = pigweed spp.
B.G. = barnyardgrass
L.Q. = lambsquarters

Table 2: Harvest and fresh weight of Honeydew and Crenshaw melons with preemergence herbicides

Herbicide	Rate lb ai/A	Fresh weight[1/] (Crenshaw)	Harvest weight (Honeydew)[2/] 4 to 6 inches No.	4 to 6 inches Wt.	6 to 8 inches No.	6 to 8 inches Wt.	Over 8 inches No.	Over 8 inches Wt.	Total No.	Total Wt.
napropamide	2	0.287	12.3	9.60	13.0	23.30	3.0	8.85	28.3	41.85
napropamide	4	0.468	14.0	11.90	21.5	39.63	1.5	4.13	37.0	55.56
diclofop	2	0.291	10.0	9.25	16.0	26.80	2.0	5.95	28.0	42.00
naptalam	6	1.045	10.5	9.65	17.0	32.18	3.0	9.33	30.5	51.15
chloramben	3	1.713	11.5	9.73	20.8	40.35	1.8	5.20	34.0	55.28
chloramben	6	1.412	11.3	9.70	18.8	33.95	4.0	11.75	34.0	55.40
nitrofen	2	0.326	8.0	6.35	18.0	34.95	4.5	13.43	30.5	54.73
nitrofen	4	0.311	7.8	6.55	13.8	26.08	3.5	11.35	25.0	43.98
napropamide + naptalam	1 + 3	0.986	6.8	5.58	21.3	41.73	4.3	14.60	32.3	61.90
naptalam + bensulide	3 + 3	0.884	8.0	6.45	18.5	34.38	4.5	13.95	31.0	54.78
naptalam + diclofop	3 + 2	0.945	13.8	11.10	15.8	31.93	3.5	11.13	33.0	54.15
naptalam + diclofop	6 + 2	0.818	7.3	5.75	16.5	35.90	2.5	7.60	26.3	49.25
napropamide + nitrofen	1 + 4	0.319	4.8	4.20	15.3	29.75	2.8	8.58	22.8	42.53
weeded control (hoed June 22, 1979)	-	0.338	12.0	10.53	15.0	25.85	2.3	5.68	29.3	42.05
unweeded control	-	0.293	4.8	3.08	3.3	5.15	0	0	8.0	8.23
$LDS_{.05}$		0.495							9.330	13.602

1/ Fresh weight (kilograms) of Crenshaw plants per 15 feet of row; removed June 28, 1979

2/ Harvest weight (kilograms) of Crenshaw melons per 20 feet of row; harvested September 10, 1979; size ranges refer to maximum diameter of melons

Herbicide evaluation in plug-mix planted melons for control of Black nightshade. Graf, J. and H. M. Kempen. Sixteen herbicides were applied on April 17, 1979 in a 5 ft. band on 8 ft. beds with a CO_2 propelled 3-nozzle boom sprayer applying 35 gpa. Plots were 40 ft. long replicated 4 times. Soil type was a loam. The herbicides were incorporated to 1.5 inches with Lilliston rolling cultivators and plug planted in 10 inch spaced hills with an 85 ml aliquot of mixture containing 100 grams of seed (Cassaba, Golden Beauty) and 3 lbs. of activated carbon, trade name Gro-Safe, mixed in a 30 lb. bag of Terra-lite Redi-earth for ten minutes. This mixture gave exactly 2 seeds/hill. Five hours of water were applied the following day through sprinklers because of poor moisture conditions in the top 3 inches of bed.

Results are in table form. Melon injury was noted in four treatments. DCPA @ 8 lbs. showed a splitting, swollen effect on melon stems at the soil line although it affected only 5 to 10% of plants. MBR 18337 showed a 50% vigor reduction evidenced by reduced size, crimped and cupped leaves on all plants at 1 and 2 lbs. Melon stand was not evaluated because of rat or mice damage.

Black nightshade control was best with Furloe at 3.0 lbs, ethalfluralin at 1.5 or 3 lbs. and CDEC at 4 lbs. The effects of ethalfluralin lasted to harvest time in July. (Cooperative Extension, University of California, P.O. Box 2509, Bakersfield, CA 93303).

Pre-emergence herbicide evaluation in plug-mix planted melons

Treatment	Rate Lb. AI/A	Average 1/ Melon vigor reduction 6-6-79	Black nightshade control 5-8-79	Black nightshade control 6-6-79	Black nightshade control 7-24-79
Check		0	.8	2.9	2.0
Bensulide	6	0	3.8	1.5	2.0
"	12	0	2.5	3.8	2.5
Dowco 295	2	0	2.0	2.3	1.2
"	4	1.0	3.4	3.0	2.9
Napropamide	1	0	3.4	5.0	.5
"	2	0	.3	0.5	0.0
Chlorpropham	1.5	0	8.1	6.5	3.5
"	3	0	9.1	8.0	5.9
DCPA	8	3.0	4.0	4.5	2.0
"	16	0	6.6	6.0	3.1
Ethalfluralin	1.5	0	9.5	9.3	8.4
"	3	0	9.8	8.8	6.8
MBR 18337	1	4.0	2.5	2.3	1.5
"	2	5.0	4.6	3.0	2.5
CDEC	2	0	1.3	1.8	3.7
"	4	0	7.3	5.5	6.2

1/ Average based on 0 to 10: 0 = No reduction or control
10 = Complete reduction or control

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 at Mesa, Arizona. Southern giant curl mustard seeds were disked into the soil and beds 40 inches apart were prepared. Six rows of Southern white globe onions were planted on each bed April 12. The same day, DCPA, bensulide, profluralin and cyanazine were applied to dry soil. The onions were irrigated-up by watering every furrow on April 13. Post-emergence herbicides were applied April 30 when the onions had two leaves and the weeds had no more than three true leaves. A natural infestation of palmer amaranth, wright groundcherry, common purslane, nettleleaf goosefoot, junglerice and red sprangletop was present. Herbicides were applied in 40 gpa of water. Treatments were replicated four times on plots two beds wide and 15 feet long. Growth of onions and weeds were observed each week until the test was terminated in July 1979.

Broadleaf weed control was excellent with oxadiazon and satisfactory with methazole. Nitrofen controlled all broadleaf weeds except Southern giant curl mustard. Dinoseb and bromoxynil gave satisfactory control of most broadleaf weeds except purslane. Sulfuric acid gave excellent control of emerged weeds but new weeds germinated and grew within 2 weeks of spraying. None of the herbicides controlled grass weeds more than 3 weeks. Cyanazine, dinoseb and bromoxynil caused moderate injury to onions. Methazole reduced onion stands. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721.)

Response of weeds and onions to preemergence and postemergence herbicides

Treatment			Weed control and onion injury Percent estimated							
Herbicide[1]		lb/A or %	Broadleaf 5/8	Broadleaf 5/21	Broadleaf 7/3	Grass 5/8	Grass 5/21	Grass 7/3	Onion 5/8	Onion 5/21
DCPA	(PE)	8.0	24	15	0	69	41	-[2]	0	0
Bensulide	(PE)	6.0	3	0	0	76	59	-	0	3
Profluralin	(PE)	0.75	6	0	0	64	56	-	0	5
Cyanazine	(PE)	1.0	38	15	0	13	3	-	10	14
Chloroxuron	(Post)	2.0	16	5	0	8	0	-	0	0
Oxadiazon	(Post)	1.0	99	97	99	84	53	3	8	8
Methazole	(Post)	1.0	98	92	71	80	70	13	20	24
Nitrofen	(Post)	3.0	83	68	59	3	0	0	0	0
Dinoseb	(Post)	1.0	64	40	0	3	0	-	6	13
Sulfuric acid	(Post)	5%	86	65	13	18	0	-	4	3
Bromoxynil	(Post)	0.3	83	61	15	0	0	-	15	14
Untreated		-	0	0	0	0	0	-	0	5

[1] PE = Preemergence, Post = Postemergence to crop and weeds.

[2] Grass control was not evaluated because of the density of broadleaf weeds.

Postemergence control of annual weeds in spring-seeded onions. Anderson, W. Powell and Gary Hoxworth. Applied postemergence to weeds less than 2-inches tall and to spring-seeded onions (Yellow Sweet Spanish) in 2-leaf stage, the herbicides bromoxynil, diclofop, mixtures of bromoxynil and diclofop, oxadiazon, and terbutryn provided excellent selective weed control. The principal weeds present were barnyardgrass, common lambsquarters, and redroot pigweed.

Bromoxynil was initially tested at 0.5 lb ai/A in 1978, and excellent control of broadleaved weeds was obtained, with no grass control and no apparent onion injury. In 1979, bromoxynil was applied at 0.33, 0.5, 0.66, and 1.0 lb ai/A and these treatments resulted in 90 to 98% control of broadleaved weeds, with no grass control and no apparent onion injury from any of the applied dosages.

Diclofop, applied at dosages of 0.75, 1.0, and 1.5 lb ai/A, provided 98% control of barnyardgrass at all dosages. However, broadleaved weeds were not controlled. The onions appeared not to be injured by diclofop at any of the applied dosages.

Mixtures of bromoxynil and diclofop, applied at dosages of 0.5 plus 1.0 lb ai/A and 0.5 plus 1.5 lb ai/A, respectively, provided 95% or better control of both grass and broadleaved weeds, with no apparent onion injury.

Oxadiazon was applied in 1978 at dosages of 1.0, 1.5, and 2.0 lb ai/A, and in 1979 at dosages of 0.75, 1.0, and 1.5 lb ai/A. Results from these tests indicate that weed control was best when oxidiazon was applied at dosages of 1.5 lb ai/A or greater and that dosages of 0.75 and 1.0 lb ai/A resulted in poor to good weed control. Applied at 1.5 and 2.0 lb ai/A, oxadiazon provided about 95% control of both grass and broadleaved weeds. Oxadiazon appeared not to cause onion injury at any of the applied dosages.

Terbutryn was applied in 1978 at dosages of 0.25 and 0.5 lb ai/A and, in 1979, at dosages of 0.75 and 1.0 lb ai/A. Results from the relatively low dosages applied in 1978 showed little or no weed control and no apparent onion injury. Results from the higher dosages applied in 1979 showed that both grass and broadleaved weeds were controlled 90 to 95%. Although the onions appeared normal in 1979, the terbutryn treatments may have caused some stand reduction. (Agricultural Experiment Station and Department of Agronomy, New Mexico State University, Las Cruces, NM 88003.)

The effect of fonofos and a microbial inhibitor on thiocarbamate injury to sweet corn. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Vernolate and EPTC were applied alone and in combination with R25788, fonofos, and a microbial inhibitor (Extender A) as preplant incorporated treatments to investigate effects on corn tolerance to the herbicides. The trial was a randomized complete block design with four replications and 2.5 by 8 m plots. 'Jubilee' sweet corn was planted on May 22, 1979 and ratings of corn ear deformity were made on August 28.

None of the vernolate treatments visibly injured the corn (see table). EPTC applied alone or in combination with R25788 or R25788 and fonofos did not cause statistically significant effects on corn ears. However, if fonofos was added to EPTC, significant injury did occur. When Extender A was added to EPTC plus R25788, even more injury occurred, whether or not fonofos was included.

Since Extender A is a microbial inhibitor, it is possible that both Extender A and dyfonate caused injury to corn by preventing rapid microbial degradation of EPTC, and thus exposed the emerging corn plant to higher-than-normal levels of EPTC. (Oregon State University, Crop Science Department, Corvallis, OR 97331)

Deformed and normal ears per 10 plants from corn grown in thiocarbamate-treated soil with and without fonofos and a microbial inhibitor

Treatment	Rate kg/ha	Deformed ears/ 10 plants	Normal ears/ 10 plants
1. vernolate	4.5	0	19.2
2. vernolate + R25788	4.5 + 0.37	0	19.0
3. vernolate + R25788 + Extender A	4.5 + 0.37 + 0.75	0	19.2
4. vernolate + fonofos	4.5 + 2.25	0	19.2
5. vernolate + R25788 + fonofos	4.5 + 0.37 + 2.25	0	20.0
6. vernolate + R25788 + Extender A + fonofos	4.5 + 0.37 + 0.75 + 2.25	0	19.5
7. EPTC	4.5	0.5	17.8
8. EPTC + R25788	4.5 + 0.37	0	20.0
9. EPTC + R25788 + Extender A	4.5 + 0.37 + 0.75	7.2	11.5
10. EPTC + fonofos	4.5 + 2.25	2.8	14.2
11. EPTC + R25788 + fonofos	4.5 + 0.37 + 2.25	0.8	17.8
12. EPTC + R25788 + Extender A + fonofos	4.5 + 0.37 + 0.75 + 2.25	7.5	10.2
13. Untreated control	0	0	17.8
	$LSD_{.05}$	2.1	2.7
	$LSD_{.01}$	2.9	3.8

Spring applied herbicides for weed control in sweet corn. Brenchley, R. G. Herbicide evaluation trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho, to evaluate potential herbicides for weed control in sweet corn (var. Golden Jubilee). Herbicide applications were made May 24, 1979 (preplant incorporated), June 1, 1979 (preemergence) and June 20, 1979 (post emergence). Environmental conditions at time of application were as follows: (May 24, 1979, air temperature 74 F, soil temperature 62 F, relative humidity 12%, wind NNW 7 mph, cloud cover 10%, soil surface dry to six inches), (June 1, 1979, air temperature 84 F, soil temperature 63 F, relative humidity 12%, wind NW 3 mph, cloud cover clear, soil surface at field capacity), (June 20, 1979, air temperature 64 F, soil temperature 63 F, relative humidity 15%, wind NW 2 mph, cloud cover 30%, soil surface moist to six inches). Soil type was a silt loam, 1.2% organic matter, CEC 14 meq, and pH 7.2. Plot size was 7 by 40 ft. Treatments were replicated four times in a randomized complete block design. Herbicide applications were made using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 30 psi pressure which delivered 32 gpa total volume. Preplant incorporated treatments were incorporated to three inches using a power roto-tiller. Crop was planted May 29, 1979 and harvested on August 21, 1979.

Rainfall amount consisted of .82 inches on May 6 to 9, .24 inches on June 18, 1979, 1.65 inches on August 14, 1979. Plots were furrow irrigated on May 18, June 12, June 28, July 17, July 28, and August 3, 1979.

Weed species and density per square foot (average of six sq. ft. per plot) six inches on either side of the corn row were redroot pigweed 8.1, hairy nightshade 8.5, and common lambsquarter 3.5. Weed control evaluations were taken June 28, 1979.

There were only two treatments which could be considered outstanding, those being metolachlor + atrazine and alachlor + atrazine. These treatments gave 90% plus control of all weed species present with a yield comparable to the handweeded check. Butylate + cyanazine, metolachlor + cyanazine and alachlor + cyanazine all gave excellent weed control; however, sweet corn yields were suppressed somewhat. (University of Idaho, SW Idaho Research and Extension Center, Parma, ID 83660)

Influence of spring applied herbicides on percent weed control and sweet corn tolerance in 1979 at Parma, Idaho.

Treatment	Method of Application[3/]	Rate lb/A	Corn % Stand	Percent Weed Control[4/] PW	LQ	HNS	Corn Yield Tons/A
Butylate	PPI	3.0	100	46	24	0	1.88
Butylate	PPI	4.0	100	69	30	0	1.96
Butylate + Cyanazine	PPI	3.0+1.5	100	97	99	96	4.92
Vernolate	PPI	3.0	100	84	94	42	1.64
EPTC + R-25788[1/]	PPI	4.0	100	74	64	55	1.12
EPTC + R-25788	PPI	6.0	89	79	88	71	3.42
Alachlor	PPI	3.0	100	97	84	85	1.64
Alachlor	PE	2.5	100	74	42	0	1.62
Alachlor + Cyanazine	PPI	2.0+1.5	100	100	100	100	3.02
Alachlor + Atrazine	PPI	2.0 + 1.25	100	100	100	99	6.02
Metolachlor	PPI	2.5	95	93	93	60	1.70
Metolachlor	PE	2.0	100	40	11	0	1.30
Metolachlor + Cyanazine	PPI	1.5+1.5	100	96	96	95	4.46
Metolachlor + Atrazine[2/]	PPI	1.5+1.2	100	100	100	100	6.36
Cyanazine	PE	2.0	87	14	72	35	2.80
Bentazon	Post	0.75	100	0	90	100	1.82
Handweeded Check			100	100	100	100	6.04
Weedy Check			100	0	0	0	0.5

[1/] EPTC + R-25788 = Eradicane (Rate = amount of EPTC)

[2/] Pre-package mix by Ciba-Geigy called Bicep.

[3/] PPI = preplant incorporated; PE = preemergence; Post = post emergence

[4/] PW = redroot pigweed; LQ = common lambsquarter; HNS = hairy nightshade

Plug planting and direct-seeding comparison in pickling cucumbers with different herbicides. Elmore, C.L. and J. Woods. A trial was established on the U. C. Davis campus (Yolo clay loam soil) to compare the performance of plug planted and direct-seeded pickling cucumbers (variety SMR 58) with different herbicides. These materials were applied by CO_2 backpack on May 14, 1979, and were incorporated immediately 1.5 inches deep with two passes of Lilliston rolling cultivators. Herbicide plots were 20 feet long by 10 feet wide (2 beds) and were replicated four times. The direct-seeded subplots were planted on May 14, 1979 to a depth of 1.5 inches at a seeding rate of approximately 4 seeds per foot. The plug subplots were planted on May 16, 1979 with 60 milliliter plugs spaced 10 inches apart down the row. These plugs consisted of a 1:1 mix of peat and vermiculite with the addition of 5 per cent activated carbon. Seed was added at a rate of 2 seeds per 60 milliliters of mix. The trial was first sprinkler irrigated (1 inch of water) on May 21, 1979, and then switched over to furrow irrigation on June 23, 1979. All plots except the unweeded control were hand weeded on June 22, 1979. Nitrogen was sidedressed at a rate of 126 pounds N per acre on June 29, 1979. The cucumbers were hand harvested seven times from July 17, 1979 to August 13, 1979.

Excellent vigor and stand of cucumbers was achieved in the plug planted subplots. No injury was detected nor stand reduction occurred with any of the herbicide treatments. On the other hand in the direct-seeded subplots, alachlor, trifluralin, naptalam, and naptalam combinations decreased cucumber vigor. Stand was also decreased with trifluralin, alachlor, and the combination of naptalam plus napropamide. Alachlor at 4.0 lb ai/A was the most severe material, followed closely by trifluralin at 1.5 lb ai/A. The overall yields with plug planting and direct-seeding were almost identical although some differences did occur within herbicide treatments (plug vs. direct) but were not significant. Weed control was good to excellent with most treatments except for trifluralin at 0.75 lb ai/A, napropramide at 2.0 lb ai/A and naptalam at 6.0 lb ai/A. (University of California Cooperative Extension, Davis, CA 95616)

Weed control and crop injury in plug planted

and direct-seeded pickling cucumbers

Table 1:

Herbicide	Rate lb ai/A	Vigor[1/] Direct seed	Vigor[1/] Plug	Stand counts[2/] Direct seed	Stand counts[2/] Plug	Weed control[3/] P.W.	Weed control[3/] B.G.	Weed control[3/] L.Q.	Weed control[3/] H.N.
trifluralin	0.75	7.8	9.8	16.3	29.0	6.5	8.8	6.8	7.5
trifluralin	1.5	6.5	9.0	11.3	28.3	8.5	9.5	9.0	9.8
alachlor	2.0	6.3	8.2	13.0	20.8	9.0	9.8	8.0	10.0
alachlor	4.0	6.0	8.5	9.3	25.3	9.5	9.8	8.0	10.0
naptalam + bensulide	6.0 + 6.0	7.8	9.2	29.3	31.0	9.0	9.9	9.0	10.0
napropamide	2.0	8.5	9.2	27.8	21.5	2.8	5.2	4.0	7.2
napropamide + naptalam	2.0 + 6.0	6.8	8.5	14.8	20.0	7.8	9.2	8.5	9.5
naptalam	6.0	7.2	8.8	27.0	22.8	5.5	6.8	5.5	8.2
weeded check	-	8.5	9.2	27.3	23.5	1.0	0.8	0.2	2.2
check	-	9.0	9.2	32.3	25.0	0.5	0.0	0.0	1.0
$LSD_{.05}$				9.304	N.S.				

1/ Vigor: 10 = vigorous, 0 = dead plants; evaluated June 10, 1979
2/ Stand counts: Per 15 feet of row; counts made July 3, 1979
3/ Weed control: 10 = complete control, 0 = no control; evaluated June 10, 1979

P.W. = pigweed spp.
B.G. = barnyardgrass
L.Q. = lambsquarters
H.N. = hairy nightshade

Yield with direct-seeding and plug planting of pickling cucumbers

Table 2:

		Number of cucumbers[1/]									
	Rate	No. 2's		No. 3's		No. 4's		Total[2/]		Culls	
Treatments	ai/A	Direct	Plug	Direct	Plug	Direct	Plug	Direct	Plug	Direct	Plug
trifluralin	0.75	49.3	48.0	68.5	76.8	24.0	30.3	141.8	155.0	7.8	10.5
trifluralin	1.5	34.0	39.0	63.0	76.0	24.0	33.3	121.0	148.3	12.5	17.5
alachlor	2.0	34.3	37.0	64.8	50.8	19.0	22.3	118.0	110.0	7.3	4.5
alachlor	4.0	32.5	43.0	69.3	83.8	26.5	29.0	128.3	155.8	11.5	19.8
naptalam + bensulide	6.0 + 6.0	48.3	54.3	82.0	90.8	32.3	36.3	162.5	181.3	22.5	24.5
napropamide	2.0	39.8	45.5	71.0	57.0	33.0	25.5	143.8	128.0	22.3	11.5
napropamide + naptalam	2.0 + 6.0	51.8	43.5	81.8	82.0	29.5	24.8	163.0	150.3	11.3	12.8
naptalam	6.0	43.8	44.0	67.8	61.8	24.5	23.8	136.0	129.5	20.5	12.0
weeded check	--	27.0	29.0	48.0	37.5	22.8	15.0	97.8	81.5	6.3	6.5
check	--	11.8	8.5	14.5	15.8	4.8	7.8	31.0	32.0	7.8	5.8
		37.3	39.2	63.1	63.2	24.0	24.8	124.3	127.2	13.0	12.5

1/ Number of cucumbers: Total from seven harvests between July 17, 1979 and August 13, 1979.
Grades: No. 2's = 1.06 to 1.5 inches maximum diameter
No. 3's = 1.5 to 2.0 inches maximum diameter
No. 4's = 2.0 to 2.25 inches maximum diameter
Culls = knobbed and curled

2/ No significant difference between the composite means of the subplots (direct vs. plug).
$LSD_{.05}$ = 44.419 between individual means.

Addition of an adjuvant to metribuzin applied to potatoes. Callihan, R. H. and P. W. Leino. An evaluation of the influence of one adjuvant upon efficacy of metribuzin for potato weed control was conducted on potatoes grown under commercial production conditions. Single drop Russet Burbank seed was planted in 36-inch rows on a sprinkler irrigated Declo loam. Treatments were applied to emerged potatoes and weeds on July 14 (the next irrigation was applied after 3 days). Metribuzin treatments were 0.25 and 0.5 lb a.l./A. Amway adjuvant was at the rate of 1 pint/A. Treatments were applied in 35 gpa water with a tractor-mounted air pressure sprayer to 12 ft x 40 ft plots in four replicates. Weed survival and potato crop tolerance were evaluated in the field and tubers were harvested at maturity and evaluated for yield and quality.

Results indicate that difference in weed and crop response due to adjuvant or metribuzin dose were not observed, although differences in potato height, total yield, yield of U.S. No. 1 tubers, total weeds, and hairy nightshade were found due to metribuzin. (University of Idaho Research and Extension Center, Aberdeen, ID 83210)

Table 1. Mean weed survival (plant/m^2)

	Metribuzin rate (lb a.i./A)	Amway Adjuv. (Pint/A)	Amaranthus	Chenopodium	Gramineae	Solanum	Kochia	Total weeds
1.	0.0	0	93	1	5	2.00 a	6.8 a	107
2.	0.5	0	85	1	1	0.00 b	6.6 a	94
3.	0.5	1	81	1	1	0.06 b	6.8 a	90
4.	0.25	0	58	1	3	0.03 b	5.6 b	68
5.	0.25	1	72	1	4	0.00 b	6.4 a	84
	Probability >F		.08	.45	.48	.001	.003	.07
	Coeff. of variation (%)		31	17	180	187	8	29

Table 2. Crop parameters

	Metribuzin rate (lb a.i./A)	Amway Adjuv. (Pint/A)	Potato Height (cm)	Specific Gravity (SG-1)x 1000	Fry Color USDA	Yield (lb/plot)	No. 1 (%)
1.	0.0	0	64 a	77	.65	43 a	32 a
2.	0.5	0	56 c	79	.62	74 b	59 b
3.	0.5	1	58 c	81	.60	74 b	61 b
4.	0.25	0	61 ab	80	.53	76 b	57 b
5.	0.25	1	60 bc	79	.68	70 b	55 b
	Probability >F		.005	.28	ns	.006	.002
	Coeff. of variation (%)		5	30	-	22	22

Barnyardgrass control in vegetable crops with diclofop-methyl. Crabtree, Garvin. In a 1979 field trial diclofop-methyl (Hoelon) and HOE 23408 PLUS were applied to several vegetable crops seeded into an area naturally infested with barnyardgrass. The herbicides were sprayed 17 days, after the crops were planted. At the time of application crop plant size varied, as a result of normal differences in development rate, from loop stage of onions to peas with four nodes. Barnyardgrass varied from plants just emerging to those with a maximum of four leaves.

Results of the study are summarized as follows:

(1) Barnyardgrass control was generally good with all treatments. Control with HOE 23408 PLUS at 0.84 and 1.68 kg/ha was comparable to Hoelon applications of 1.12 and 2.24 kg/ha, respectively.

(2) Peas and onions appeared to have adequate tolerance for both herbicides.

(3) Beets, when evaluated nine days after the herbicide applications, appeared to be stunted by both herbicides but had recovered one month later.

(4) Beans were evaluated as having adequate tolerance to Hoelon but tolerance was marginal to HOE 23408 PLUS.

(5) Both carrots and cucumbers sustained injury levels with both herbicides that would make their use on these crops questionable.

(Horticulture Department, Oregon State University, Corvallis, Oregon 97331).

Weed control in beans with ethalfluralin. Crabtree, Garvin. Ethalfluralin and herbicide combinations with ethalfluralin were compared to other standard herbicide treatments in a 1979 field trial. Preplant sprays were soil incorporated to a depth of 8 cm with a "Roterra" tiller and the crop was seeded the following day. Preemergence and post emergence herbicide applications were made 5 and 10 days, respectively, after planting. Treatments are listed and results summarized in the table. Crop and weed response ratings are averages of the three dates: early, mid and late season.

Bean crop growth, as measured by growth reduction rating (GR) and yield, reflects the level of weed control and competition from the remaining weeds in these plots. With the particular weed complex present, the best weed control and the best yields were obtained in treatments combining ethalfluralin with dinoseb. (Horticulture Department, Oregon State University, Corvallis, Oregon 97331).

The effect of herbicides on weed control and crop response in beans

Herbicide treatment	Application		Crop and weed response ratings 1/						Bean yield
			Beans		wild radish and mustard		Redroot pigweed		
	Rate (kg/ha)	2/ time	SR	GR	SR	GR	SR	GR	(100's gms/plot)
1. Ethalfluralin	1.68	PPI	3	14	65	20	100	100	66 cd 3/
2. Ethalfluralin	1.96	PPI	5	19	73	26	97	81	75 bcd
3. Ethalfluralin	3.92	PPI	11	17	73	30	100	100	76 bcd
4. Ethalfluralin EPTC	1.68 3.36	PPI	2	8	67	24	99	93	83 abcd
5. Ethalfluralin EPTC	1.96 3.36	PPI	2	7	77	28	98	81	89 abcd
6. Ethalfluralin EPTC	1.68 4.48	PPI	3	10	73	27	99	95	84 abcd
7. Ethalfluralin EPTC	1.96 4.48	PPI	3	13	70	42	92	83	81 abcd
8. Ethalfluralin Dinoseb	1.68 5.04	PPI PE	3	3	99	93	98	88	117 ab
9. Ethalfluralin Dinoseb	1.96 5.04	PPI PE	3	3	97	87	97	85	120 a
10. Ethalfluralin Dinoseb	1.68 3.36	PPI Post	1	11	99	95	99	91	108 abc
11. Ethalfluralin Dinoseb	1.96 3.36	PPI Post	3	8	100	100	98	91	105 abc
12. Trifluralin	.84	PPI	1	10	49	24	90	79	56 de
13. Trifluralin EPTC	.84 3.36	PPI	1	11	65	28	91	72	74 bcd
14. Trifluralin EPTC	.84 4.48	PPI	4	11	69	30	98	90	72 cd
15. EPTC	3.36	PPI	2	14	32	7	69	29	60 de
16. EPTC	4.48	PPI	1	14	55	29	79	57	61 de
17. Dinoseb	5.04	PE	1	6	96	85	70	41	94 abcd
18. Dinoseb	3.36	Post	1	13	98	92	57	31	78 bcd
19. Weeded check			1	7	72	41	60	32	87 abcd
20. Check			1	20	27	4	27	6	39 e

1/ Visual ratings, o = no effect, 100 = complete kill; SR = stand reduction, GR = growth reduction

2/ PPI = pre-plant incorporated, PE = pre emergence, Post = post-emergence

3/ means separation at 0.01 level with Newman - keuls test

Effect of initial irrigation on the activity of three preemergence herbicides. Bendixen, W. E., A. H. Lange, L. J. Nygren and J. T. Schlesselman. On august 13, 1979, a trial was established in Los Alamos, Santa Barbara County to determine the effect of tree levels of initial irrigation on the activity of metribuzin at 2 lb ai/A, napropamide at 4 lb ai/A and CDEC at 8 lb ai/A. The herbicides were applied to 5 by 5 foot plots with nine replications in a loam soil consisting of 58.8% sand, 32.0% silt, 9.5% clay and 0.87% organic matter. Immediately following herbicide application, a rain simulator was used to apply 1/3 inch, 1 inch and 3 inches of water to the plots (three replications for each irrigation level). The plots received no further water for one week, which should probably have been a more extended period because of the residual nature of the herbicide.

All plots were seeded with corn, lima beans, snap beans, sugar beets, tomatoes and alfalfa on August 20, 1979. The experiment was then uniformaly sprinkler irrigated to bring up the crops.

Soil cores (two inches in diameter by eight inches deep) were extracted from each plot on August 22, 1979 to determine the extent of downward movement of the herbicides. The cores were laid horizontal and seeded with Kentucky blue grass along the eight inch length. A phytotoxicity rating of the blue grass showed that metribuzin moved over twice as far into the soil than either napropamide or CDEC. This may be due to metribuzin being considerably more soluble than the other herbicides.

A weed control rating taken after one month resulted in all herbicides being 100% effective on Malva and nearly so on wild radish, regardless of initial irrigation level.

An evaluation of crop vigor was only possible on snap beans due to the erratic germination of the other crops. The 2 lb ai/A rate of metribuzin was too phytotoxic and nothing germinated in any of the plots. The snap beans showed excellent tolerance to both napropamide and CDEC regardless of initial irrigation level.

The metribuzin plots were reseeded on September 28, 1979 with corn, lima beans and tomatoes, in hopes of obtaining a stand sufficent for evaluating the herbicide's residual activity. The effect of metribuzin after two months on all crops showed that the vigor of corn, beans and tomatoes was dramatically reduced with three inches of initial irrigation compared to the lesser amounts. (University of California, Cooperative Extension, P. O. Box 697, Santa Maria, CA 93456)

Effect of metribuzin at 2 lb ai/A with varying levels of initial irrigation as indicated by three test crops

Crop		Average[1/]	
	1/3 inch	1 inch	3 inches
Corn	7.0	6.0	2.7
Lima beans	8.3	8.3	5.3
Tomatoes	7.0	6.0	2.7

1/ Average of 3 replications where 0 = no stand and 10 = best growth and vigor. Treated 8/13/79. Reseeded 9/28/79. Evaluated 10/15/79.

Yellow nutsedge control in plug planted cotton and tomatoes. Lange, A. H. and J. T. Schlesselman. A trial was established on March 22, 1979 by planting UC 82 tomatoes and treating the Panoche clay loam soil with two herbicides at three rates and three herbicides at two rates each with six replications.

A standard peat-vermiculite plus carbon; viterra, super phosphate, and sand was used for the plug mix. The mix and the cotton seed plus tomato seed were mixed in a cement mixer for 20 minutes.

The herbicides were preplant incorporated into the soil at a speed of 1 MPH and at a depth of three inches with a Howard tiller on March 22, 1979. The plot was irrigated by furrow about one month after treatment and plug planting. Therefore, the stand of tomatoes was very poor, but some information was attainable in addition to weed control ratings.

Excellent yellow nutgrass control was attained with NC 20484 at all rates. Dowco 295 also gave good to excellent nutsedge control. The relative overall stand of tomatoes was a result of the lack of irrigation, however, Dowco 295 appeared safe on both cotton and tomatoes and NC 20484 was toxic to both. MBR 18337 was quite safe on tomatoes but was intermediate on nutsedge. Fluridone was safe on the cotton, toxic to the tomatoes and poor on the nutsedge with the delay of irrigation present in this trial.
(University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

Table 1. The effect of five preplant incorporated herbicides on the control of nutsedge, sowthistle, and lambsquarter and the effect on plug planted tomatoes

		Average 1/			
Herbicides	lb/A	Nutsedge	Tomato Vigor	Sowthistle	Lambs-quarter
EPTC	4	5.3	3.2	10.0	10.0
EPTC	8	7.8	2.2	10.0	10.0
Dowco 295	2	8.7	6.0	5.3	10.0
Dowco 295	4	8.8	7.3	4.7	7.8
Fluridone	1/4	3.2	0.8	10.0	10.0
Fluridone	1/2	2.0	0.8	10.0	10.0
Fluridone	1	2.5	0.0	9.2	10.0
MBR 18337	1	3.8	5.7	5.3	6.7
MBR 18337	2	6.3	6.0	9.2	10.0
NC 20484	1	9.5	2.5	9.3	10.0
NC 20484	2	10.0	0.5	9.0	9.2
NC 20484	4	10.0	0.0	10.0	10.0
Check	-	1.5	6.0	1.0	6.7

1/ Average of 6 replications where 0 = no effect and 10 = best stand or complete control. Evaluated 5/20/79.

Table 2. The effect of preplant incorporation on tomato stand, cotton vigor and yellow nutsedge control.

Herbicides	lb/A	Tomato Stand	Average[1/] Cotton Vigor	Nutsedge Control
EPTC	4	2.8	5.2	7.2
EPTC	8	1/5	4.0	7.7
Dowco 295	2	3.7	8.8	9.7
Dowco 295	4	5.0	7.7	9.0
Fluridone	1/4	0.8	8.0	5.0
Fluridone	1/2	0.8	7.8	7.2
Fluridone	1	0.0	8.5	7.8
MBR 18337	1	5.7	6.5	4.4
MBR 18337	2	5.0	7.2	5.5
NC 20484	1	2.7	7.2	9.7
NC 20484	2	0.8	5.3	9.8
NC 20484	4	0.7	5.3	10.0
Check	-	5.0	7.8	2.6

1/ Average of 6 replications where 0 = no stand or no effect and 10 = complete control or best stand. Treated 3/22/79. Evaluated 6/26/79.

Screening new herbicides for preemergence weed control in processing tomatoes in a Hanford fine sandy loam. Lange, A. H. and J. T. Schlesselman. The seed bed was prepared and seeded March 13, 1979. The herbicides were applied April 4, 1979 and sprinkler irrigated. The weed control by species was rated May 11, 1979. The crop phytotoxicity and weed control were read May 1, 1979. Fresh weights were taken and averaged to give weight per plant.

The phyto ratings showed several herbicides with surviving crop plants at the low rates and severe injury at the higher rates. Some of these severely injured plants recovered and outyielded the weedy check. One such compound was Ortho 28269. The phyto rates indicated severe injury at 2 and 4 lb ai/A rates. The weight by June 4, 1979 showed virtually no injury compared to the untreated check. The fresh weights are somewhat confounded by the presence of plant competition from several weed species, but the bottom line is that healthy plant tissue at all rates and weed control means a degree of selectivity. Dowco 295 gave rather poor general weed control at 2 lb ai/A but controlled nutsedge at several locations. Pebulate applied preemergence even at 8 lb ai/A gave good selectivity for tomatoes. The presence of the extender with pebulate did not increase selectivity although the variation was high, it looked like it may have been less selective. The complete non-selective herbicides for each crop was quite clear for most herbicides. (University of California, Cooperative Extension, 9240 South Riverbend Ave., Parlier, CA 93648.)

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

		Average Weed Control 1/				
Herbicides	lb/A	Tumbling Pigweed	Fiddle-neck	Nut-sedge	Other Weeds	Weeds Present 2/
Simazine	2	10.0	10.0	9.0	9.0	PV
Simazine+Oryzalin	1+4	10.0	10.0	8.2	9.0	PV,B
Simazine+Oryzalin	2+4	10.0	10.0	6.2	9.0	PV
Ortho 26197	1	10.0	8.2	9.0	8.0	H,PV,C,G
Ortho 26197	2	10.0	10.0	9.0	9.8	PV
Ortho 26197	4	10.0	10.0	10.0	10.0	
Ortho 28269	1	10.0	6.0	10.0	7.2	R,S,P
Ortho 28269	2	10.0	6.2	10.0	7.0	R,PV,P,S
Ortho 28269	4	9.8	8.8	10.0	7.0	R,PV,S
MBR 18337	1/2	5.8	4.8	9.2	5.8	PV,S,C,R, H,W
MBR 18337	2	9.2	6.8	9.0	8.0	R,PV,P,C
PPG 225	1/2	8.8	10.0	9.0	9.0	PV
PPG 225	2	10.0	10.0	9.0	9.0	S,PV,C,G
R 40244	1	10.0	10.0	9.8	9.2	P,G
R 40244	4	10.0	10.0	9.0	10.0	
Am. Cy. 213975	1	10.0	10.0	4.8	9.2	S
Am. Cy. 213975	2	10.0	10.0	9.2	9.2	PV
Am. Cy. 213975	4	10.0	10.0	8.2	10.0	
EL 171	1/2	8.2	10.0	10.0	9.0	PV
EL 171	2	10.0	10.0	6.2	9.8	S
UBI S-734	1/2	5.8	4.8	9.0	7.8	R,S
UBI S-734	1	8.2	6.8	9.2	6.2	R,PV,S
UBI S-734	2	9.2	6.0	10.0	7.2	PV,S,R
Oxyfluorfen+Oryzalin	2+4	10.0	10.0	10.0	10.0	
Oxyfluorfen+Napropamide	2+4	10.0	10.0	6.0	10.0	
Oxyfluorfen	2	10.0	10.0	7.8	10.0	
NC 20484	1	6.2	7.0	10.0	6.0	P,M
NC 20484	4	9.8	9.2	10.0	10.0	
Dowco 295	2	6.0	4.8	9.2	8.2	S,C,M,R
Dowco 295	8	9.8	6.8	10.0	8.8	M,S,PV
Norflurazon	2	10.0	9.2	10.0	8.8	S,R
Norflurazon	3	9.2	9.0	9.0	9.8	PV
Norflurazon	4	10.0	9.8	9.2	8.8	PV
Pebulate	8	9.0	6.8	10.0	6.8	R,S,P
Pebulate+Extender	8	7.8	5.2	8.8	6.0	PV,R,LQ
Glyphosate (preplant)	5 qts.	5.8	3.0	6.2	4.8	R,PV
Glyphosate (preplant)	10 qts.	5.8	5.8	8.2	5.8	C,R,PV
Glyphosate (postplant)	10 qts.	6.2	8.8	5.0	6.2	C,G,R,PV
Weedy Check	-	7.2	5.8	8.2	3.0	R,PV
Weedy Check	-	5.0	3.2	9.2	2.4	R,C,S,H,PV

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

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

Table 2. The effect of 18 herbicides on tomatoes, cantaloupes, and cotton as indicated by fresh weights. (425-73-501-100-1-79).

		Average[1/] Grams Per Plant		
Herbicides	lb/A	Tomatoes	Melons	Cotton
Simazine	2	0.0	0.0	6.5
Simazine+Oryzalin	1+4	0.0	3.3	7.9
Simazine+Oryzalin	2+4	0.0	0.0	0.7
Ortho 26197	1	0.0	0.0	23.3
Ortho 26197	2	0.0	0.0	6.2
Ortho 26197	4	0.0	0.0	7.7
Ortho 28269	1	97.0	34.8	6.7
Ortho 28269	2	69.9	37.8	7.8
Ortho 28269	4	38.8	124.8	1.0
MBR 18337	1/2	27.3	15.4	5.8
MBR 18337	2	30.3	30.2	5.7
PPG 225	1/2	44.2	93.6	7.2
PPG 225	2	10.0	36.7	2.9
R 40244	1	6.0	236.3	10.0
R 4022	4	0.0	0.0	7.8
Am. Cy. 213975	1	23.9	76.3	12.8
Am. Cy. 213975	2	9.9	155.2	4.4
Am. Cy. 213975	4	0.0	6.2	7.1
EL 171	1/2	0.0	134.4	9.3
EL 171	2	0.0	13.3	9.4
UBI S-734	1/2	44.5	20.9	3.8
UBI S-734	1	12.1	20.9	3.8
UBI S-734	2	47.4	44.4	4.2
Oxyfluorfen+Oryzalin	2+4	0.0	9.2	3.5
Oxyfluorfen+Napropamide	2+4	17.9	7.5	2.1
Oxyfluorfen	2	0.0	4.6	2.9
NC 20484	1	5.5	0.9	5.5
NC 20484	4	0.0	10.4	5.5
Dowco 295	2	36.7	32.1	6.1
Dowco 295	8	49.0	73.3	9.4
Norflurazon	2	109.7	200.0	9.5
Norflurazon	3	0.0	0.0	7.2
Norflurazon	4	0.0	0.0	3.6
Pebulate	8	64.9	14.4	6.8
Pebulate+Extender	8	25.6	10.3	3.5
Glyphosate (preplant)	5 qts.	3.6	4.3	2.2
Glyphosate (preplant)	10 qts.	26.2	22.2	6.1
Glyphosate (postplant)	10 qts.	15.9	9.6	5.8
Weedy Check	-	6.7	4.6	3.6
Weedy Check	-	39.8	16.8	3.3

1/ Average of 3 replications. Treated 4/4/79. Evaluated 6/14/79.

Evaluation of oxyfluorfen plus simazine for weed control in almonds. Kempen, H. M. Five oxyfluorfen plus simazine treatments were applied 11-28-79 to almonds with an AMC sprayer unit at 30 gpa using 8006 plus OC-6 nozzles. Herbicide plots were 10 feet wide banded in tree row by 1325 ft. replicated two times. All treatments were applied with 1/4 percent triton AG-98 wetting agent; 2X treatments were applied to the Mission variety. Soil was a loam under sprinkler irrigation. Two rows of the ten treated were Mission variety, the other variety was Nonpareil.

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

Weed control was excellent in all treatments until September harvest time when the last readings were made. Weeds controlled were filaree, marestail, and cheeseweed, a few that were still present around the permanent set spinner heads. The middle untreated areas were composed of 75 percent puncturevine, 20 percent fleabane and 5 percent jungle rice. (Cooperative Extention, University of California, P.O. Box 2509, Bakersfield, CA. 93303).

Evaluation of oxyfluorfen plus simazine for weed control in almonds

		Averages 1/				
	Lbs.	Weed control			Tree injury	
Herbicide	AI/A	2-6-79	5-2-79	8-29-79	5-2-79	8-29-79
Check	-	0	0	0	0	0
Oxyfluorfen + Simazine	1 + .5	10	9.9	10	0	0
Oxyfluorfen + Simazine	1 + 1	10	10	10	1	0
Oxyfluorfen + Simazine	2 + .5	10	9.9	10	0.5	0
Oxyfluorfen + Simazine	2 + 1	10	10	10	0.5	0
Simazine + Paraquat 2/	1 + .5	10	9.7	10	1	2

1/ Averages are of 2 replications. 0 = No effect; 10 = complete kill.

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

The effect of continuous use of herbicides for strip weed control in pistachios. Schlesselman, J. T. and A. H. Lange. Herbicides were applied the same season of planting. Trees were planted February, 1974 and February, 1978. Herbicide applications were made December 16, 1976, December 22, 1977, April 6, 1978 and December 29, 1978. The young trees planted in 1978 were treated with herbicides on April 6, 1978 and December 29, 1978.

Only norflurazon showed significant symptoms on the young pistachios. Fluridone, although similar in effect on plants, did not cause phytotoxicity symptoms in either age tree at one-quarter the rate of norflurazon. However, it appears to require about one-quarter the rate to control the same weed species as seen by the weed control ratings which were excellent for fluridone even at 1 la ai/A. Fluridone, like norflurazon, will control nutsedge preemergence.

The other herbicides appeared somewhat weak on nutsedge and marestail. Some herbicides such as napropamide and oxadiazon were extremely weak on the weed species present. Oryzalin was probably second to fluridone and norflurazon. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

The effect of preemergence herbicides on pistachio trees and annual weed control

Herbicides	lb/A	Phytotoxicity 1/ 1 yr. old Pistachios	5 yr. old Pistachios	Weed Control 2/	Weeds Present 3/
Napropamide	4	0.0	0.0	3.2	M,F,NS,CS, W,C
Oryzalin	4	0.0	0.0	7.6	N,M,C,F
Prodiamine	4	0.0	0.0	6.2	M,N,F,WH
Oxyfluorfen	2	0.0	0.0	3.7	CG,M,W,C,F
Oxyfluorfen	4	0.0	0.0	5.0	CG,C,M,W
Norflurazon	2	0.0	0.0	4.8	M,C,WH
Norflurazon	4	0.0	0.0	7.4	C,M,W,F
Norflurazon	8	4.3	0.7	7.5	M,C,PW
Fluridone	1	0.0	0.0	8.1	M,N,C,B
Fluridone	2	0.0	0.0	9.0	M
Oxadiazon	2	0.0	0.0	2.5	M,CG,F,NS C,W
Oxadiazon	4	0.0	0.0	2.8	M,F,CG,C
Check	-	0.0	0.0	0.5	M,C,F,CG,W K,S,NS,FT

1/ Average of 3 replications where 0 = no effect and 10 = complete kill.
2/ Average of 13 replications where 0 = no control and 10 = complete weed control.
3/ Weeds present: C-cupgrass, CG-crabgrass, B-bermudagrass, F-flaxleaf fleabane, K-knotweed, M-marestail, N-nutsedge, NS-nightshade, W-barnyard grass, WH-willowherb, PW-pigweed. Treated 12/16/76, 12/22/77 (older trees); 4/6/78 (young trees); 12/29/78. Evaluated 7/26/79.

Six years continued evaluation of subsurface layered dichlobenil plots in figs. Kempen, H. M. Dichlobenil at four different rates was applied on September 5, 1979 to third year furrow irrigated Calimyrna figs using an 8 ft. spray blade running 1/2 to 1 1/2 inches deep. Plot size was 16 ft. by 45 ft. long. Plots were on a Delano sandy loam. The purpose of the experiment was to study the tolerance of figs to dichlobenil, but subsequent evaluation through 1979 continued to show symptoms of phytotoxicity at higher rates that were equally obvious in 1974.

Dichlobenil at 2 lbs/acre showed phytotoxic effects in 1974 which consisted of chlorotic leaves and necrotic, burned leaf tissue. These phytotoxic symptoms increased as the rate increased, to give an overall injury rating of 7.5 out of 10 at 16 lbs. a.i./acre in 1974.

In 1976 phytotoxic symptoms were approximately the same. Chlorosis on London rocket in plot area reinforced evidence that dichlobenil [its metabolite(s)] was still in the soil at all rates of application.

In 1978, phytotoxic symptoms had decreased, but were still evident. There were slight symptoms at 4 lbs/A of no significance to tree vigor, with more injury symptoms at higher rates. Differences in height between trees in the orchard were too great to evaluate if dichlobenil affected this parameter.

In 1979, 8 and 16 lbs/acre showed continued phytotoxic symptoms.

The trial suggests that dichlobenil, or a metabolite, is too persistent in soils to permit commercial usage on figs. Observations on treated plums, peaches and apricots in other orchards which show similar long-term symptommology (but without apparent economic damage to trees) suggests that dichlobenil and its metabolites be more critically evaluated because of these side effects. (Cooperative Extension, University of California, Bakerfield, Ca. 93303).

Six years continued evaluation of subsurface layered dichlobenil plots in figs

		Leaf injury 1/							
		1974				1976			
		June	November			June	November		
Herbicide	Rate lbs AI/A	rating	Rating	Percent chlorotic	Percent necrotic	rating	Rating	Percent chlorotic	Percent necrotic
Check 2/	0	.5	0	0	trace	0	0	0	0.5
Dichlobenil	2	2	2.5	3	1	1.5	1.5	2	2
"	4	2.5	4.0	8	1	2.5	2.5	6	4
"	8	4.0	6.0	25	22	4.0	4.5	35	15
"	16	4.5	7.5	42	35	5.0	5.5	45	20

		Leaf injury 1/				
		1978	1979			
Herbicide	Rate lbs AI/A	Nov. rating	July rating	Oct. rating	Percent chlorotic	Percent necrotic
Check	0	0	0	0	< 5	< 5
Dichlobenil	2	0	0	0	< 5	< 5
"	4	1.5	.5	0	< 5	< 5
"	8	4.0	2.5	3	20	7
"	16	4.5	3.5	4.5	40	18

1/ Rating 0 to 10: 0 = no effect; 2 = herbicide induced chlorosis; 4 = severe chlorosis; 5 = necrosis and chlorosis; 10 = dead.
Percent chlorotic: percentage of leaf area that is chlorotic.
Percent necrotic: percentage of leaf area that is necrotic.

2/ Traces of chlorosis or necrosis in November ratings due to normal senescence.

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

The trees in this test were treated with glyphosate May 5, 1977, September 21, 1977, September 11, 1978 and May 15, 1979; Dinoseb was applied September 11, 1978 and May 15, 1979; MSMA at 8 and 16 lb ai/A was applied May 5, 1977, September 21, 1977 and May 15, 1979.

The results of continuous spraying of these tree trunks has caused no injury of two ages of young trees. Glyphosate was also applied in this year's screening trial at near dormancy and after the trees started to grow without injury. The weeds in the untreated plots caused more injury than the sprays to newly planted pistachios at 5 and 10 lb ai/A. (University of California, Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

The effect of repeated herbicide sprays
on the trunks of established trees.

Herbicides	lb/A	Pistachios 3 years	Average[1/] Pistachios 5 years	Apple 5 years[2/]
Glyphosate	2	10.0	9.7	10.0
Glyphosate	4	8.7	9.0	9.7
Glyphosate	8	9.0	10.0	9.7
Glyphosate	16	8.7	7.3	9.0
Dinoseb	4	-	-	10.0
Dinoseb	8	8.7	10.0	10.0
Dinoseb	16	8.7	8.7	8.0
MSMA	4	-	-	10.0
MSMA	8	9.0	9.7	10.0
MSMA	16	8.3	9.0	10.0
Check	-	8.7	10.0	9.3

1/ Average of 3 replications where 0 = no growth and 10 = best growth.
2/ Age of tree.

Comparison of controlled droplet applications vs. conventional applications of glyphosate on bermudagrass in grapes. Graf, J. and H. Kempen. A comparison between a conventional nozzeled boom and a Micron Herbi® unit which delivers uniform 250 micron droplets was made to evaluate the "Herbi's" effectiveness an an application tool for glyphosate. Advantages of the Herbi unit which applied 1-2 gals. solution per acre vs. 35-40 gals. solution per acre for a conventional sprayer would be cost and energy reductions. Light field equipment could be tailor made to treat berms of vine and tree crops that would reduce initial cost for application equipment, reduce compaction, reduce water carrier and fuel requirements in spraying.

Treatments with glyphosate were applied to the berms of six year old Ruby Cabernet grapes on May 25, 1979 before the grape canes reached the ground. The berms were heavily infested with Bermudagrass approximately nine inches tall. Any low canes were cut to eliminate the possibility of herbicide contact with foliage. Glyphosate solutions of 25%, 50% and 62% (of commercial formulation) were mixed and applied at 2 gals./A to establish treatments of 2 lbs., 4 lbs., and 5 lbs. a.i./A. We added 0.5% X-77 wetting agent to 2 lbs. of glyphosate salt for a fourth treatment. These same rates were applied with a CO_2 backpack sprayer in 35 gpa carrier.

The results indicate that good control of Bermudagrass is possible at 4 lbs. and 5 lbs. a.i. glyphosate salt/A. The Herbi application was more effective than the conventional sprayer in this trial. The wetting agent seemed to enhance glyphosate activity with both methods of application for the 2 lbs. a.i./A rate, although glyphosate contains substantial wetting agent and when applied at high concentrations through the Herbi units, should not have had an enhanced effect. (University of California Coop. Extension, P.O. Box 2509, Bakersfield, Ca. 93303).

Comparison of controlled droplet application vs conventional nozzled boom applications of glyphosate on bermudagrass in grapes.

Herbicide	Rate lb/A	Bermudagrass control 1/ Herbi 2/ 6-21-79	7-24-79	10-16-79
Check	--	0	0	2.5
glyphosate 4EC	2	8.5	8.5	6.5
" + .5% X-77	2	9.5	9.5	9.5
glyphosate 4EC	4	9.5	9.8	7.5
"	5	9.5	9.8	9.0
Average all ratings			8.9	

Herbicide	Rate lb/A	Bermudagrass control 1/ Conventional nozzled boom 3/ 6-21-79	7-24-79	10-16-79
Check	--	0	0	0
glyphosate 4EC	2	5.2	7.5	4.7
" + .5% X-77	2	4.3	7.0	6.5
glyphosate 4EC	4	9.2	9.2	9.2
"	5	9.2	9.7	9.0
LSD .05 =		1.6	1.6	2.0
LSD .01 =		2.3	2.3	3.0
Average all treatments			7.5	

1/ Bermudagrass control: 0 = no control; 10 = complete control.

2/ Herbi: two tandem mounted Micron Herbi rotary atomizers which applied two gallons of solution per acre. Droplet size is 250 microns. No replications.

3/ Conventional nozzle boom: Application with a CO_2 backpack sprayer with two Tee-jet 8003 flat fan nozzles; 30 gallons of solution applied per acre. Three replications, adjacent to Herbi trial.

Evaluation of three foliar applied herbicides for the control of pampasgrass. McHenry, W.B. and N.L. Smith. Pampasgrass is valued by some for its ornamental silk-like plumes, to others it is a difficult to kill landscape and rangeland weed in frost-free coastal zones. An experiment was initiated in 1978 on an established planting on the U.C. Davis campus to test the efficacy of amitrole, dalapon, and glyphosate applications (summer vs. winter) for pampasgrass control. Four replications were employed with each plot consisting of a single clump varying from 3 to 8 feet in diameter. Summer applications were made July 26 and 17th 1978 when the growth stage ranged from pre to late boot. December 4, 1978 was the late date applications to plants that were past full bloom. Herbicide rates were based on active ingredient per hundred gallons with individual plants receiving varying amounts of spray solution based on their size. Amitrole and dalapon (plus 0.5% v/v X-77) were applied on a spray to wet basis and averaged 1/2 gallon of solution per plant. Glyphosate was applied spray to wet (high volume) and at a low volume of 1 to 1.5 pints per plant. Good control was obtained from late applications of glyphosate on a spray to wet basis. Control from low volume glyphosate applications was appreciably less. Winter glyphosate (low spray volume) applications were superior to summer treatments. Timing of application was not as critical with dalapon and acceptable control was achieved utilizing 20 lb ai/hg rate. Amitrole was not as effective for control of pampasgrass. (University of California Cooperative Extension, Davis, CA 95616)

Pampasgrass response to three herbicides

Herbicide	Ai/HG	Application timing	Spray volume	control (10=100%) 3/12/79	7/3/79
amitrole	2	Summer	High	0.3	0
	2	Fall	High	4.8	0.8
amitrole	4	Summer	High	1.8	0.8
	4	Fall	High	4.3	2.5
dalapon	10	Summer	High	3.5	4.3
	10	Fall	High	2.0	5.0
dalapon	20	Summer	High	5.3	6.5
	20	Fall	High	4.0	7.3
glyphosate	5	Fall	High	8.0	8.6
	10	Fall	High	9.0	9.7
glyphosate	5	Summer	Low	1.3	1.0
	5	Fall	Low	3.3	5.3
glyphosate	10	Summer	Low	2.5	4.8
	10	Fall	Low	4.5	7.4
control	-	-	-	0	0

Using preemergence herbicides on deciduous nursery stock. 1/Richards, W.D., 2/C. Collins, and 2/R. Collins. On May 11, 1979, a trial was established at Pacific Coast Nursery Inc., Sauvie Island, on 4 deciduous tree varieties to determine the effectiveness of 4 preemergence herbicides. Three of the varieties were grown in the field from seed and were transplanted in the test area on May 11,1979. These plants were cockspur hawthorn, littleleaf linden, and thornless honeylocust. The other variety was grown in the greenhouse and was asexually propagated from cuttings. This was a red maple (Acer rubrum 'Red Sunset'), and was also transplanted in the test area on May 11, 1979. 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 napropamide 50W at 4 lb ai/A, napropamide 50W at 4 lb ai/A plus oxadiazon 2G at 4 lb ai/A, oryzalin 75W at 1 lb ai/A, oxadiazon 2G at 4 lb ai/A, and trifluralin 4E at .75 lb ai/A. The treatments were applied on May 22, 1979.

Initial observations on weed control and crop tolerance were taken on July 2, 1979 with two subsequent checks made on August 15, 1979 and September 11, 1979. The plots were given a visual rating from ∅ to 10 for weed control and crop tolerance. The weeds observed were barnyard grass, curly dock, mustard, wild radish, and yellow foxtail which we planted in order to have a sufficient amount of grass for a valid rating.

The napropamide 50W plus oxadiazon 2G combination proved to give the best results for weed control and crop tolerance. 1/(Research Supervisor, Pacific Coast Nursery Inc., Route 1, Box 320, Portland, Oregon 97231 and 2/Consulting Entomologists, Route 2, Box 81C, Hillsboro, Oregon 97123).

Effects of preemergence herbicides on deciduous nursery stock grown on Sauvies Island, Oregon

Treatment	Rate	hawthorn	linden	locust	red maple cuttings
napropamide 50W	4 lb ai/A				
broadleaf control		8.9	7.9	7.3	6.7
grass control		7.5	8.1	8.0	8.2
crop tolerance		0.3	0.8	0.9	1.2
napropamide 50W plus oxadiazon 2G	4 lb ai/A plus 4 lb ai/A				
broadleaf control		9.3	9.6	8.1	8.3
grass control		9.4	9.8	8.9	8.0
crop tolerance		0.3	1.1	0.3	0.9
oryzalin 75W	1 lb ai/A				
broadleaf control		5.2	4.3	5.6	6.2
grass control		6.1	8.4	6.5	7.8
crop tolerance		0.3	1.6	0.8	0.9
oxadiazon 2G	4 lb ai/A				
broadleaf control		7.6	6.7	8.7	7.4
grass control		8.5	9.6	5.0	7.5
crop tolerance		0.6	0.6	2.6	0.9
trifluralin 4E	.75 lb ai/A				
broadleaf control		5.6	3.3	4.0	4.6
grass control		3.1	6.3	4.5	6.2
crop tolerance		0.5	2.0	2.0	1.6

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

PROJECT 5

WEEDS IN AGRONOMIC CROPS

Neil E. Humburg - Project Chairman

SUMMARY -

Reports on control of weeds in agronomic crops are arranged in alphabetical order by crops. Several reports dealt with more than one crop; three such reports conclude this section. Eighty-eight reports were submitted.

Alfalfa - Rate was more important than timing of application on tolerance of seedling alfalfa to paraquat. Alfalfa was injured when planted 175 days after DPX-4189 treatments. Timing of herbicide applications in California altered efficacy of treatments in established alfalfa. Hexazinone was superior to metribuzin as a spring treatment in established alfalfa on sandy loam soil. BAS-9052 showed promise for controlling yellow foxtail. Fall application of diuron, metribuzin and terbacil controlled winter mustards in New Mexico. Winter application of paraquat or prodiamine was more effective than numerous soil-active herbicides for controlling yellow foxtail. Common mallow, shepherdspurse and henbit were controlled by R-40244.

Barley - A survey for wild oat in spring barley fields in Colorado revealed widespread infestation but limited reduction of crop yields. Wild oat in barley was controlled in Idaho with SD-45328, barban and diclofop + R-40244.

Beans - Subsurface layer applications of alachlor and metolachlor gave excellent control of yellow nutsedge in large lima beans. Preplant incorporation and subsurface layering of alachlor were comparable treatments which did not affect kidney beans. NC-20484 controlled barnyardgrass. Green beans following wheat were more tolerant of residual DPX-4189 than other rotational crops. Herbicide combinations were superior to individual herbicides for wide-spectrum weed control in pinto beans; several materials, cycloate, ethalfluralin, bentazon and metolachlor, controlled hairy nightshade. Neither PPG-124 nor R-33865 extended residual life of EPTC.

Corn - Postemergence diclofop, BAS-9052 and RO-13-8895 controlled seedling annual grasses but injured corn in a California study. Extenders were ineffective in promoting longevity of EPTC. Alachlor + atrazine and EPTC + R-25788 controlled field sandbur and wild buckwheat in field corn. Sweet corn planted 90 days after application of DPX-4189 was severely injured.

Cotton - Fluridone controlled numerous annual and perennial weeds in cotton. Glyphosate applied as a spray and by wick rope caused temporary stunting.

Lentils - Preemergence applications of dinoseb and R-40244 controlled many weed species and increased lentil yields. Diclofop was superior to several herbicides for reducing wild oat populations. Wild oat in lentils was partially controlled by oxyfluorfen or RH-8817 following triallate.

Oats - Tolerance of winter oats to DPX-4189 decreased with later timings of applications of higher treatment rates.

Peas - Varietal differences in tolerance of peas to numerous herbicides was observed in Idaho. Oxyfluorfen + triallate and R-40244 controlled wild oat, and dinoseb and R-40244 controlled downy brome as well as many broadleaf weeds.

Peppermint - Research in Oregon showed that common groundsel was controlled by DPX-4432 without injuring peppermint, but yields were reduced by oxyfluorfen. DPX-4189 at 0.035 kg/ha killed peppermint.

Potatoes - Herbicide combinations were more effective than single-herbicide treatments against kochia and hairy nightshade in potatoes.

Rape - Numerous weed species in winter rape were controlled by trifluralin + diallate, but crop tolerance to trifluralin was variable. Control of wild oat by diclofop or HOE-23408+ resulted in improved yields. Rape was injured when planted 175 days after DPX-4189 application.

Sugarbeets - Combinations of herbicides were more effective than single herbicides when all species were considered. Sequential herbicide applications were more effective than preplant applications only. Split applications of postemergence herbicides gave better performance than single applications. A Colorado study showed that cycloate with extender controlled weeds as well as cycloate and appeared to suppress sugarbeets less. Herbicides that controlled sunflower were only partially effective against velvetleaf. Diclofop + desmedipham + phenmedipham was highly effective against broadleaved weeds. In Utah diclofop + ethofumesate was an outstanding postemergence treatment and diclofop showed excellent control of barnyardgrass. Phenmedipham and ethofumesate showed synergistic action against common knotweed in California.

Sunflower - Preplant and preemergence applications of individual herbicides in dryland sunflower, with the exception of alachlor, did not result in weed control comparable to mixtures. Stands were not reduced by butylate + R-25788.

Wheat - Tolerance of durum wheat varieties to various herbicides differed in Arizona; all but severely injured wheat recovered. Difenzoquat, MSMA, FC-9204 and SD-45328 controlled wild oat in spring wheat but yields were not increased. Bromoxynil provided better control of fiddleneck in Anza wheat than did 2,4-D. Slightly better full-spectrum broadleaf weed control was obtained in Idaho with DPX-4189 and DPX-4189 + metribuzin than with 2,4-D. Metribuzin + bromoxynil provided good control of redstem filaree and various annual broadleaf weeds, but yields were not comparably increased. Cutleaf nightshade escaped control by DPX-4189 applied postemergence in Wyoming. Difenzoquat, diclofop and barban did not control mayweed and miners lettuce, but terbutryn controlled wild oat in Idaho. Difenzoquat mixed with aqueous nitrogen fertilizer partially controlled wild oat without causing excessive crop phytotoxicity. In Oregon, downy brome was much more difficult to control than Italian ryegrass, yet excellent downy brome control was demonstrated with DPX-4189. Diclofop and diclofop + R-40244 have high wheat yields and partial to excellent control of ripgut brome. Efficacy of 43 herbicides was determined on jointed goatgrass and winter wheat in a greenhouse study. A Utah study demonstrated control of Canada thistle in the rosette stage with DPX-4189.

Multi-crop - Studies using numerous crops were conducted to evaluate direct and residual effects of DPX-4189, postemergence treatments for grass control, and extenders for butylate and EPTC.

Efficacy and crop tolerance of paraquat on seedling alfalfa. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Two field trials were conducted in western Oregon to evaluate paraquat for crop tolerance and weed control in seedling alfalfa. Alfalfa (Dupuits) was planted on June 12, 1979 at a 30-cm row spacing with one seed per cm of row. Italian ryegrass and Powell amaranth were seeded over the efficacy trial. The tolerance trial was oversprayed with 2,4-DB amine at 0.6 kg/ha to eliminate weed competition.

Treatments in each trial were arranged in a randomized block design with five replications. The efficacy trial had 5 by 10 m plots while the tolerance trial had 2.5 by 10 m plots. Paraquat was applied at rates of 0.14, 0.28, and 0.56 kg/ha in 3, 6 to 8, and 9 to 10 trifoliolate leaf stages.

Visual evaluations of percent crop injury and weed control were made on August 1, 1979. On August 10, a 0.92 by 9 m strip was harvested from each plot. Dry weight, acid and neutral detergent fiber, and crude protein were determined in the efficacy trial and dry weight was determined in the tolerance trial.

Powell amaranth and Italian ryegrass were controlled more effectively at the higher rates, and effectiveness decreased with the two lower rates in the later timings (Table 1). Rate of paraquat was more important than timing of application on alfalfa injury in both trials (Tables 1 and 3).

Forage dry weight responded to paraquat applications similarly in both trials (Tables 2 and 3). The untreated control in the efficacy trial produced the greatest amount of dry weight. This was due partially to the weeds present in the control plots.

Acid detergent fiber percentage was reduced in the paraquat treatments while percent crude protein was increased. The percentage of neutral detergent fiber was lower in the paraquat treatments but differences were not statistically significant.

Although dry weight yield of the first cutting was reduced with most applications of paraquat, most treatments did not greatly reduce the alfalfa stand. Subsequent harvests will determine the impact of paraquat on yield and stand life. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Percent crop injury and weed control in newly-established alfalfa with paraquat

Paraquat (kg/ha)	Alfalfa	Powell amaranth	Italian ryegrass
	(% control)		
3 trifoliolate			
0.14	34	70	92
0.28	68	89	99
0.56	91	92	99
6-8 trifoliolate			
0.14	24	58	80
0.28	43	80	96
0.56	76	85	98
9-10 trifoliolate			
0.14	18	61	67
0.28	61	74	83
0.56	85	88	97
Untreated control	0	0	0

Table 2. Forage quality of newly-established alfalfa treated with paraquat

Paraquat (kg/ha)	Dry wt. (kg/ha)	Acid detergent fiber	Neutral detergent fiber	Crude protein
		(%)		
3 trifoliolate				
0.14	1008	26.9	36.7	21.4
0.28	394	22.9	35.0	24.0
0.56	91	-	-	-
6-8 trifoliolate				
0.14	1050	23.5	36.4	21.5
0.28	649	22.6	33.9	23.2
0.56	269	-	-	-
9-10 trifoliolate				
0.14	991	24.3	35.8	22.0
0.28	612	22.1	33.8	22.9
0.56	201	-	-	-
Untreated control	2085	30.2	42.5	17.6
$LSD_{.05}$	319	3.0	n.s.	1.7
$LSD_{.01}$	427	4.0		2.4

Table 3. Alfalfa injury and dry weight with paraquat applications in a weed-free seedling stand

Paraquat (kg/ha)	Injury (%)	Dry weight (kg/ha)
3 trifoliolate		
0.14	13	1140
0.28	46	599
0.56	88	179
6-8 trifoliolate		
0.14	16	913
0.28	34	984
0.56	71	207
9-10 trifoliolate		
0.14	18	921
0.28	46	704
0.56	74	175
Untreated control	0	1416
	$LSD_{.05}$	261
	$LSD_{.01}$	350

Control of winter mustards in established alfalfa. Anderson, W. Powell and Gary Hoxworth. Alfalfa growers in New Mexico have complained for years that they were unable to control London rocket, flixweed, and tansy mustard (winter annual weeds that they refer to as "winter mustards") in established alfalfa with currently registered herbicides. In the past, the growers have consistently applied these herbicides in the spring (April and May) when it was apparent that they had an obvious weed problem.

In order to ascertain just what the problem was, a study was initiated in the winter of 1978 and continued the following fall and late winter. Results of this study show that the best control of the winter mustards was obtained when the herbicides were applied in the fall, rather than in the spring, and as it turned out, the results substantiated the label recommendations for the respective herbicides.

Herbicides included in this study, and their dates of application and dosages, are shown in the Table, along with their respective degree of control of London rocket and flixweed. Each treatment within a date of application was replicated four times and the data presented represent an average of the four replications. Although few tansy mustard plants were present in the experimental area, it is assumed, from the few that were present and were controlled, that the control of this weed would be similar to that of flixweed with these herbicides.

Temperature is an important factor when applying 2,4-DB or dinoseb. For effective weed control, the temperature should be 60 F or above when these herbicides are applied and remain above 60 F for at least 4 or 5 hours following application. Lower temperatures the following day appeared not to reduce herbicide effectiveness. Temperature was not a factor when applying the herbicides diuron, metribuzin, and terbacil.

When using the herbicide 2,4-DB, the ester form was far superior to its salt form when rain fell shortly after application. In an adjacent test comparing the effectiveness of the dimethylamine salt of 2,4-DB with the isooctyl ester of 2,4-DB, little or no weed control was obtained with the salt form of 2,4-DB, while very good control of the winter mustards was obtained with the ester of 2,4-DB. These treatments were applied in December 1978 to plots 12 ft by 100 ft and replicated three times. Rates of application in each case were 0.75 and 1.0 lb ai/A. A 1-inch rain fell about 5 hours after the treatments were applied.

If the herbicide dinoseb is applied in the fall of the year, it will be necessary to apply it again in late winter (preferably late February or early March, depending on location) in order to control the later germinating winter mustards. If desired, 2,4-DB ester may also be applied in late February or early March. When applying dinoseb or 2,4-DB ester in the fall or late winter, the daytime temperature must be 60 F or greater for at least 4 to 5 hours after application.

The herbicides diuron, metribuzin, and terbacil were very effective when applied in established alfalfa in the fall of the year, after the last cutting; they were much less effective when applied in the spring.

It was apparent from this study that nondormant and semidormant alfalfa could be safely treated with the five herbicides included in these tests. Alfalfa yield data was taken in 1978 and 1979 and none of the treatments resulted in yield reductions. (Agricultural Experiment Station and Department of Agronomy, New Mexico State University, Las Cruces, NM 88003.)

Control of the winter annual weeds London rocket and flixweed in established alfalfa at Arrey, New Mexico.

Treatments		London rocket control (%)[1/] Applied				Flixweed control (%)[1/] Applied			
Herbicides	lbs ai/A	Nov.	Dec.	Jan.[2/]	Feb.	Nov.	Dec.	Jan.[2/]	Feb.
2,4-DB ester	0.75	100	100	0[3/]	91	98	96	0[3/]	86
	1.00	100	100	0[3/]	88	93	97	0[3/]	76
dinoseb, acid form	1.25	100	95	85	94	10[4/]	0[4/]	70	91
	1.88	100	98	85	97	10[4/]	0[4/]	70	96
diuron	1.2	100	100	95	30	99	81	95	41
	1.6	100	100	95	30	100	87	95	30
	2.4	100	100	95	40	100	98	95	45
metribuzin	0.5	100	96	100	98	89	97	30	20
	0.75	100	100	100	100	98	96	30	30
	1.0	100	100	100	100	100	98	100	40
terbacil	0.4	100	100	85	30	99	100	85	26
	0.8	100	100	98	30	100	100	98	35
	1.2	100	100	98	40	100	100	98	60

Treatments applied January 11, November 8, and December 6, 1978, and February 27, 1979. Each treatment replicated four times and percent control shown represents average value for the four replications.

1/Evaluated March 26, 1979, except for 2/ which was evaluated April 5, 1978.

3/Due to poor London rocket and flixweed control, a second application of 2,4-DB was applied February 8, 1978, and this treatment resulted in 98% control of both London rocket and flixweed. Earlier poor control was attributed to too low a temperature at time of application.

4/Due to poor control of flixweed, dinoseb was applied again on March 1, 1979, and this treatment resulted in 90% or better control of flixweed when evaluated March 26, 1979. The control of London rocket by the November and December applications was as shown in the table, evaluated prior to the second application of dinoseb.

Weed control in dormant, dryland alfalfa. Alley, H. P. and N. E. Humburg. Individual herbicides and 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. Downy brome was in the 1-leaf stage with 0 to 2 tillers and field pepperweed had not emerged. All treatments were applied with a 6-nozzle knapsack unit in a total of 40 gpa water carrier. Plots were 9 ft by 25 ft, arranged in a randomized complete block, with three replications. Air temperature was 56 F with 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, 22.4% clay, 2.4% organic matter with a 6.5 pH).

Percentage weed control and alfalfa stand were determined by visual evaluations on June 13, 1978, and June 15, 1979, approximately 2 and 14 months following treatment. The experimental plots were 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. Pronamide at 0.75 and 1.0 lb ai/A resulted in 99% and 96% control of downy brome, respectively; whereas, the combination of oxyfluorfen/pronamide at 0.25 + 0.5, 0.375 + 0.5 and 0.5 + 0.5 lb ai/A gave 90% or greater control of downy brome. Ten individual herbicides and/or combinations (oxyfluorfen, metribuzin, hexazinone and terbacil as individual herbicide applications and combinations of oxyfluorfen/pronamide, acifluorfen/pronamide and hexazinone/terbacil) resulted in 90% or greater control of field pepperweed. No individual treatment was effective on both the grass (downy brome) and annual broadleaf weed (field pepperweed). However, the combination treatments of oxyfluorfen/pronamide and acifluorfen/pronamide resulted in 90% or greater control of both the annual grass and broadleaf weeds recorded. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-987).

Weed control and alfalfa stand

Herbicide	Rate	Alfalfa stand		Weed control[1]			
				1978		1979	
	lb ai/A	1978	1979	DB	FP	DB	FP
propham	3.0	93	100	53	12	40	0
oxyfluorfen/pronamide/WA[2]	0.25 + 0.5	100	100	77	68	93	42
oxyfluorfen/pronamide/WA	0.375 + 0.5	100	100	92	100	96	98
oxyfluorfen/pronamide/WA	0.5 + 0.5	100	100	97	100	90	96
oxyfluorfen/pronamide/WA	0.25 + 0.25	97	100	63	97	80	58
oxyfluorfen/paraquat/WA	0.25 + 0.25	100	100	88	98	38	75
paraquat/WA	0.5	100	100	95	100	50	80
oxyfluorfen/WA	0.5	100	100	23	93	8	50
oxyfluorfen/WA	1.0	97	100	93	100	47	93
acifluorfen/pronamide/WA	0.5 + 0.5	100	100	93	100	95	96
pronamide	0.75	100	100	63	20	99	8
pronamide	1.0	100	100	27	30	96	0
metribuzin (50W)	0.5	100	100	67	100	25	92
metribuzin (50W)	0.75	100	100	97	100	33	90
metribuzin (4F)	0.5	97	100	67	99	42	93
metribuzin (4F)	0.75	100	100	87	100	50	87
metribuzin (4L)	0.5	100	100	83	100	50	63
metribuzin (4L)	0.75	100	100	98	100	50	85
hexazinone (DF)	0.5	100	100	80	100	30	95
hexazinone (DF)/terbacil (80W)	0.5 + 0.5	100	100	100	100	33	93
hexazinone (DF)/metribuzin (4L)	0.5 + 0.5	100	100	97	100	25	55
terbacil (80W)	0.5	100	100	85	100	55	78
terbacil (80W)	1.0	100	100	97	100	33	95

[1]Abbreviations: DB = downy brome; FP = field pepperweed.
[2]Triton AG-98 added at ½% v/v.

A comparison of preemergence herbicides in established alfalfa. Lange, A. H. and C. Summers. Preemergence herbicides were applied February 23, 1979 to a small border of Moapa-69 alfalfa planted July 11, 1977 at 25 lb ai/A in a Hanford fine sandy loam soil at the Kearney Field Station. The organic matter was 0.75%, sand 59%, silt 33%, and clay 8%. It rained .65 inch soon after application and was subsequently flood irrigated as needed. The 8 inch alfalfa was cut February 23, 1979 and removed just before herbicide application.

Cuttings were made and weighed on April 13, 1979 and May 17, 1979. Vigor ratings were made May 1, 1979 and July 9, 1979 where 0 = no regrowth and 10 = best growth. Grass control was rated July 9, 1979. Broadleaf weeds were controlled by all treatments. All plots had been treated July 8, 1977 with 3 lb ai/A of EPTC and preplant fumigated with Telone at 50 gpa.

The results clearly indicated injury from metribuzin at the high rate at the first cutting. By the second cutting, only the high rate of metribuzin and diuron were showing reduced fresh weight. Yield from the hexazinone plots were among the highest as was the vigor and weed control when evaluated in midsummer. The vigor and weed control were poor at the high rate of metribuzin because of this herbicide for grass control. (University of California Cooperative Extension, 9240 South Riverbend Avenue, Parlier, CA 93648)

Table 1. The effect of spring applications of three herbicides on the growth of alfalfa (first cutting)

Herbicides	lb/A	Average[1/] weight in pounds of fresh alfalfa
Metribuzin	1/2	16.5
Metribuzin	1	14.2
Metribuzin	2	10.1
Hexazinone	1/2	17.0
Hexazinone	1	14.0
Diuron	2	13.2
Check (including weeds)	-	26.0

1/ Average fresh weight per 10 by 10 foot plot for 3 replications. Evaluated 4/13/79.

Table 2. The effect of spring applications of three herbicides on the growth of alfalfa (second cutting)

Herbicides	lb/A	Average[1/] weight in pounds of fresh alfalfa
Metribuzin	1/2	25.0
Metribuzin	1	26.8
Metribuzin	2	15.3
Hexazinone	1/2	27.8
Hexazinone	1	20.4
Diuron	2	12.9
Check	-	24.9

1/ Average fresh weight per 10 by 10 foot plot for 3 replications. Evaluated 5/17/79.

Table 3. The effect of preemergence herbicides on established alfalfa

Herbicides	lb/A	Average[1/] Alfalfa Vigor	Average[1/] Weed Control
Metribuzin	1/2	8.7	8.3
Metribuzin	1	7.7	6.7
Metribuzin	2	5.3	1.3
Hexazinone	1/2	9.3	9.7
Hexazinone	1	8.0	8.0
Diuron	2	4.7	4.3
Check	-	9.3	10.0

1/ Average of 3 replications where 0 = no effect, grassy; mostly lovegrass and 10 = best vigor, best weed control.

Timing of treatments for winter annual weed control in dormant alfalfa. Norris, R. F., C. A. Schoner, Jr., and R. A. Lardelli. Several herbicides are available to use for weed control in dormant alfalfa in California. These herbicides are typically used in a period from early December to late January. Past experience has indicated that treatment made at different times in this period have provided differeing levels of weed control. An experiment was therefor established during the 1978-1979 winter period to evaluate influence of date of treating on herbicide efficacy.

A seven year old alfalfa field near Madison, Yolo county, California was chosen for the experiment. The native weed population included abundant common groundsel, common chickweed, and shepherds purse plus lesser quantities of henbit and speedwell. An infestation of yellow foxtail developed in the summer of 1979. Herbicides, and rates applied, are indicated on the table. Treatments were applied with a CO_2 backpack sprayer with 8004 nozzles operated at 30 psi and delivering 40 gal/A of spray solution; weed oil plus dinoseb was applied at 80 gal/A. Plot size was 8 ft by 33 ft, and each treatment was replicated four times in a randomized split-plot design. Treatments were applied on Dec. 12, 1978 when the weeds were 0.5 to 1.0 inches tall, on Jan. 3, 1979 when the weeds were 1 to 2 inches tall, or on Feb. 1, 1979 when the weeds were 1 to 2.5 inches tall.

No herbicide treatment was more toxic to alfalfa than any other. Treatments at the two earlier dates showed no phytotoxicity, but all treatments applied on Feb. 1, 1979 resulted in decreased alfalfa vigor; this could reflect both increased competition due to presence of weeds through December and January, or could reflect less time for the late-treated alfalfa to recover from the herbicide effects.

All herbicides, or combinations, tested provided effective control of chickweed with the exception of the dinoseb treatment. Likewise control of shepherd's purse was also good with all treatments. Common groundsel control varied greatly with the herbicide and the time of application. Diuron did not provide adequate control at any date of application. The herbicides mixed with dinoseb, including diuron, pronamide or chlorpropham, and metribuzin or terbacil all gave good groundsel control when applied early, but were much less active when applied in January or February. Weed oil plus dinoseb showed high activity, with only a slight decrease at the later treating dates. Groundsel control by paraquat was complete and did not show any difference in relation to date of application. The only herbicides that showed any effect on yellow foxtail in the summer were metribuzin or terbacil; and only then when applied on Feb. 1, 1979. A 1.5 lb/A rate of terbacil was also included in the experiment (data not presented); this provided much improved grass control in the summer, but again showed greatest activity when applied on Feb. 1, 1979. The experiment showed that timing of winter herbicide applications in alfalfa in California can alter the efficacy of the treatments, depending on the herbicide and the weed species involved. (Botany Department, University of California, Davis, and Cooperative Extension, Woodland).

Weed control in dormant alfalfa with herbicides applied at differing times in the winter.

Herbicide treatment	Rate lb/A	Treat. date	Alfalfa vigor	Weed control CG 3/7/79	CC 3/7/79	SP 3/7/79	YF 8/28/79
Untreated check	-	12/12	9.6	2.0	1.0	1.8	1.5
		1/3	9.4	0.5	0.0	0.8	2.2
		2/1	9.4	0.8	0.8	1.2	2.2
diuron	2.4	12/12	8.9	4.5	10.0	10.0	2.5
		1/3	9.3	2.8	10.0	10.0	2.2
		2/1	8.5	3.2	10.0	9.2	1.5
diuron + dinoseb	2.4 + 1.75	12/12	9.5	9.2	10.0	10.0	2.5
		1/3	9.6	8.4	10.0	10.0	2.8
		2/1	6.8	6.8	7.1	10.0	2.0
dinoseb	1.75	12/12	9.0	8.4	6.9	8.7	2.8
		1/3	9.5	7.4	7.2	8.9	3.2
		2/1	8.5	6.4	10.0	9.0	1.8
pronamide + dinoseb	1.5 + 1.75	12/12	9.4	9.1	10.0	9.9	1.5
		1/3	9.1	7.6	10.0	9.9	2.8
		2/1	7.8	5.0	10.0	8.5	4.0
chlorpropham + dinoseb	3.0 + 1.75	12/12	9.6	9.5	10.0	10.0	1.0
		1/3	9.2	8.7	10.0	9.9	2.0
		2/1	8.0	7.9	10.0	10.0	1.8
dinoseb + weed oil	1.75 + 30 gal/A	12/12	10.0	10.0	9.9	10.0	1.9
		1/3	10.0	9.8	9.5	10.0	1.5
		2/1	7.0	8.3	9.4	10.0	1.0
paraquat	0.56	12/12	10.0	10.0	10.0	10.0	1.2
		1/3	9.4	10.0	10.0	10.0	1.5
		2/1	7.0	10.0	10.0	9.8	0.8
metribuzin	1.0	12/12	9.5	9.3	10.0	10.0	2.1
		1/3	9.4	5.6	10.0	10.0	3.8
		2/1	7.0	6.4	10.0	10.0	4.0
terbacil	0.75	12/12	9.5	9.3	10.0	10.0	3.0
		1/3	9.6	5.6	9.5	10.0	2.8
		2/1	7.8	6.4	9.9	10.0	4.9

All data are means of four replications.
CG = common groundsel; CC = common chickweed; SP = shepherd's purse;
YF = yellow foxtail.
Vigor: 0 = dead, 10 = normal; Control: 0 = none, 10 = complete kill.

Postemergence control of yellow foxtail in established alfalfa. Norris, R. F., D. R. Ayres, and R. A. Lardelli. Yellow foxtail continues to be the most serious weed problem in alfalfa in many areas of the central valley of California. Development of postemergence grass killing herbicides for selective use in dicotyledon crops offers the possibility of controlling this serious weed in alfalfa.

Several herbicides, see table for chemicals and rates used, were applied on June 29, 1979 to an established alfalfa field on the farm at the University of California at Davis. Treatments were applied immediately following the third cutting. The grass had germinated in mid-March but was still partially etiolated and weakened by competition from the alfalfa; it was about 4 inches tall, but had been mowed. A CO_2 backpack sprayer was used for herbicide application, and was set at 30 psi, fitted with 8004 nozzles, and delivered 40 gal/A of spray solution. Plot size was 8 ft by 10 ft, and each treatment was replicated three times in a randomized complete block design.

There was no phytotoxicity to the alfalfa at the next cutting from any of the herbicides. BAS-9052 was the only herbicide tested that provided adequate control of the yellow foxtail. The high degree of control obtained was considered particularly significant in the light of there being no entirely satisfactory treatment currently available for control of this weed. BAS-9052 would thus seem to warrant further testing for control of yellow foxtail in alfalfa. (Botany Department, University of California, Davis).

Evaluations of postemergence herbicides for control of yellow foxtail in established alfalfa.

Herbicide	Rate Lb/A	yellow foxtail control 7/11/79	8/8/79	10/31/79
Untreated check	-	0.0	0.7	2.3
diclofop	1.5	1.3	3.0	3.0
diclofop	3.0	2.7	3.3	4.7
BAS-9052 + Sun 11E	0.5 + 1 qt/A	7.0	8.7	9.7
BAS-9052 + Sun 11E	2.0 + 1 qt/A	8.7	9.7	9.7
AC-206784 + X-77	1.5 + 0.25%	1.3	2.7	4.3
AC-206784 + X-77	3.0 + 0.25%	0.0	0.0	2.7
AXF-1080	0.5	0.0	1.0	4.7
AXF-1080	2.0	0.3	2.0	2.0

All data are means of three replications; 0 = no control, 10 = complete kill

Evaluation of fall-applied herbicides for weed control in established alfalfa. Alley, H. P. and N. E. Humburg. Research plots for evaluating fall-applied herbicides were established October 11, 1978, two weeks after the last cutting. Downy brome was sparse with 0.5 to 1.0-inch leaf height and had been frosted. Plots were 9 by 30 ft, arranged in a randomized complete block design with three replications. The soil was a loamy sand (83.2% sand, 8.4% silt, 8.4% clay, 1.0% organic matter and 8.2 pH). Herbicides were applied with a 6-nozzle knapsack spray unit in 40 gpa water carrier.

Weed control was determined by visual evaluations. The broadleaf weeds and grass were also separated from the harvested alfalfa at the time of yield determinations. The combination of propham/metribuzin was the most effective treatment, resulting in nearly complete control of the weeds as evaluated by visual evaluations and substantiated by separating weeds from harvested alfalfa. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-988).

Weed control and alfalfa production from fall-treated alfalfa plots

Herbicides	Rate lb ai/A	Percent control[1/]			Alfalfa stand	Lb/A air dry		
							Weeds	
		TM	BM	DB	%	Alfalfa	Broad-leaf	Grass
oryzalin/paraquat	1.0 + 0.25	57	38	33	100	3910	250	160
oryzalin/paraquat	1.5 + 0.25	70	52	57	100	2920	430	60
oryzalin/paraquat	2.0 + 0.25	57	28	37	100	3510	270	130
paraquat	0.25	70	45	55	100	3330	380	70
propham/metribuzin	3.0 + 0.25	99	100	100	98	4510	0	6
propham/metribuzin	3.0 + 0.5	100	100	100	98	3310	0	0
Check	---	0	0	0	100	3330	500	95

1/ Abbreviations: TM = tansy mustard; BM = blue mustard; DB = downy brome.

Evaluation of five soil-active herbicides for weed control in established alfalfa. Smith, N.L. and W.F. Richardson. Northern California has two distinct weed populations in alfalfa, winter annuals germinating in the fall and summer annuals which begin their life cycle in the spring. The objective of this experiment was to compare timing of soil active herbicides to better achieve season long weed control. The site selected near Red Bluff, California, contained a uniform population of winter weeds and had a history of yellow foxtail, a difficult to control summer annual. A split plot design was utilized, with early herbicide applications made November 28, 1979. At this date alfalfa was 4 to 15 inches tall with annual ryegrass 4 to 6 inches, seedling chickweed, seedling common groundsel and wild radish present. Annual ryegrass (12 inches high), common groundsel (1 to 3 inches), common chickweed (seedlings to 6 inches diameter plants) and wild radish (4 to 8 inches) were present at the late application made January 23, 1979. Herbicides were applied utilizing a CO_2 backpack sprayer calibrated to deliver 30 GPA spray volume. Four replications were employed with a plot size of 10 by 25 ft. Paraquat was included with all materials for knockdown of existing vegetation.

Excellent control of winter annual weeds was observed on March 30, 1979 in all plots receiving paraquat,with and without soil-active herbicides. An evaluation for yellow foxtail control on September 14 indicated that excellent control regardless of treatment date was obtained from both 2 and 4 lbs ai/A of prodiamine. None of the other soil-active herbicides tested were effective for yellow foxtail control. (University of California Cooperative Extension, Davis, CA 95616 and Red Bluff, CA 96080)

Soil residual herbicides for weed control in alfalfa

Herbicide	Ai/A	Timing	March 30, 1979				September 14, 1979
			Annual ryegrass	Wild radish	Common chickweed	Common groundsel	Yellow foxtail
diuron	1.6	Early	9.8	10.0	9.5	10.0	0
	1.6	Late	10.0	10.0	10.0	10.0	0
diuron	2.4	E	10.0	10.0	10.0	10.0	2.3
	2.4	L	10.0	10.0	10.0	10.0	1.3
terbacil	0.5	E	9.8	10.0	10.0	10.0	3.3
	0.5	L	10.0	10.0	10.0	10.0	3.5
terbacil	1.0	E	10.0	10.0	10.0	10.0	2.8
	1.0	L	10.0	10.0	10.0	10.0	2.8
hexazinone	0.25	E	9.8	9.8	9.8	10.0	2.0
	0.25	L	10.0	10.0	10.0	10.0	2.0
hexazinone	0.5	E	9.3	10.0	9.8	10.0	0.5
	0.5	L	10.0	10.0	10.0	10.0	0.5
metribuzin	0.5	E	9.8	9.0	10.0	10.0	0.5
	0.5	L	10.0	10.0	10.0	10.0	1.0
metribuzin	1.0	E	9.8	10.0	10.0	10.0	1.3
	1.0	L	10.0	10.0	10.0	10.0	0.5
prodiamine	2.0	E	10.0	9.8	10.0	10.0	9.0
	2.0	L	9.0	8.8	9.8	10.0	8.9
prodiamine	4.0	E	9.5	9.8	10.0	10.0	10.0
	4.0	L	9.5	10.0	10.0	10.0	9.8
paraquat	0.5	E	9.3	8.8	10.0	10.0	0.5
	0.5	L	8.5	7.8	9.3	10.0	0.5
control	-	E	0	1.3	0	3.8	0.8
	-	L	0	0	1.3	2.5	0.5

Early: 11/28/79
Late: 1/23/79

Comparison of several herbicides for winter annual weed control in established alfalfa. Smith, N.L. and C. Wilson. Alfalfa hay quality can be reduced by the presence of winter annual weeds. An established alfalfa field in Sutter County was selected to compare six soil-active herbicides applied alone and in combination with the contact herbicide, paraquat. Applications were made January 29, 1979 to 250 ft^2 plots utilizing a CO_2 backpack sprayer calibrated to deliver a spray volume of 30 GPA. Four replications were employed. A surfactant (X-77) 0.25% v/v was included in all treatments except dinoseb. Weeds present at application included wild oat, common foxtail, and common chickweed. Materials tested and results are shown in the table following.

Terbacil alone and in combination with paraquat, diuron, (2,4 lb ai/A + paraquat) and metribuzin (1.0 lb ai/A + paraquat) provided excellent control of both grasses and chickweed. Prodiamine was effective for chickweed control; hexazinone was somewhat weaker on the weeds present at the rates tested. Paraquat appeared to be more effective than dinoseb. (University of California Cooperative Extension, Davis, CA 95616)

Weed control in established alfalfa

		Weed control (10=100%)[1/]		
		April 11, 1979		June 1, 1979
Herbicide	Ai/A	Grass[2/]	Common chickweed	Grass[2/]
diuron + paraquat	1.6 + 0.5	7.3	9.0	7.8
diuron + paraquat	2.4 + 0.5	9.0	9.5	8.8
diuron	2.4	5.9	9.0	6.0
terbacil + paraquat	0.5 + 0.5	9.0	9.0	9.4
terbacil + paraquat	1 + 0.5	9.4	9.5	9.2
terbacil	1.0	9.4	9.4	9.7
hexazinone + paraquat	0.25 + 0.5	6.3	8.0	7.4
hexazinone + paraquat	0.5 + 0.5	5.0	3.5	6.0
hexazinone	0.5	4.3	7.3	6.1
metribuzin + paraquat	0.5 + 0.5	6.0	3.3	5.5
metribuzin + paraquat	1 + 0.5	8.5	8.7	8.5
metribuzin	1.0	7.5	8.9	8.0
prodiamine + paraquat	2 + 0.5	5.8	9.9	6.6
prodiamine + paraquat	4 + 0.5	7.3	9.3	8.6
chlorpropham + dinoseb	3 + 1.8	9.0	9.7	8.8
chlorpropham + dinoseb	6 + 1.8	9.4	9.7	9.3
paraquat	0.5	3.5	4.5	5.5
dinoseb	1.8	0	0	1.5
control	-	0	0	1.0

1/ Average of 4 replications

2/ Grass: wild oats, common foxtail

Annual weed control in a mixed stand of alfalfa and perennial grasses. Lee, G. A., W. J. Schumacher, G. A. Mundt, and W. S. Belles. A trial was established at Moscow, Idaho, to determine the potential of several herbicides applied at two different dates for the selective control of annual weeds in an alfalfa-grass forage production area. Herbicide treatments were applied on February 24, 1978, when the crop was dormant and on March 31, 1978, when the grass and alfalfa had started to break dormancy (some actively growing shoots visible).

R-40244 was applied only on the early date, but buthidazole, simazine and terbacil were applied on the February and March dates of treatment (accompanying table). Each plot was 9 ft. by 30 ft. and each treatment was replicated three times in a completely randomized block design. All herbicide treatments were applied with a knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa total volume. Flat fan 8004 TeeJet stainless steel nozzles, 40 psi boom pressure, and a ground speed of 3 mph were used to attain the desired rate of application. Field conditions on February 24 and March 31 were air temperature 43 F and 68 F, soil temperature at 4 inches 44 F and 60 F and percent relative humidity 71 and 48, respectively. At the early date of application, there was a full cloud overcast, wind of 1 to 3 mph and the soil moisture was at field capacity. When treatments were applied on March 31, the sky was clear, no wind, and the soil moisture was at field capacity. The soil at the study sites is classified as a Palouse silt loam with 3.5% organic matter and a pH of 6.5.

Visual evaluations were made on June 2, 1978, and yield data was obtained on June 20, 1978. The harvest operation was accomplished by clipping two, 2 ft. diameter quadrat areas from each plot. The alfalfa and desirable perennial grasses were separated from the annual weeds, the biomass dried, and yield per acre calculated based on dry weight of each sample. Total weed control was calculated based on the weight of weed biomass in each plot compared to the weight of weeds harvested from the nontreated check plots.

R-40244 at .5 lb/A gave excellent control of shepherdspurse and henbit. At a 1.0 lb/A rate, R-40244 was weak on common mallow and redstem filaree but on a weed weight basis provided 98 percent total control. R-40244 at rates of 2.0 and 4.0 lb/A gave 92 and 96 percent common mallow control, respectively. No other herbicide treatment in the study provided control of this species. Buthidazole (50W) at .5 and .75 lb/A gave 95 percent or better total control. Buthidazole effectively controlled all weed species except common mallow. The granular formulation of buthidazole resulted in substantial vigor reduction of both alfalfa and perennial grasses compared to the wettable powder formulation. Simazine applied on February 24, 1978, resulted in substantially better weed control than the treatment made March 31. Buthidazole and terbacil gave excellent control of all species except common mallow regardless of application timing. (Idaho Agric. Exp. Sta., Moscow, ID)

Effect of herbicide treatments on alfalfa-grass forage crop and percentage weed control at Moscow, Idaho

Treatment	Rate lb/A	%Stand Gr.[2]	%Stand Alf[3]	%Vig.Red[4] Gr.	%Vig.Red[4] Alf	Percentage Control Sh. purse	Percentage Control Henbit	Percentage Control Common Mallow	Percentage Control Common Chickweed	Percentage Control Redstem filaree	Forage Yield[1] Tons/A	Total Weed % Control	Total Weed Wt lb/A
Check	0	100	100	20	9.7	-	-	-	-	-	2.07	0	4360
R-40244(DOR)[5]	.5	100	100	0	0	100	100	23.3	81.7	6.7	4.96	85	660
R-40244(DOR)	1.0	100	100	0	0	100	100	65	98.3	50	3.29	98	110
R-40244(DOR)	2.0	100	100	0	0	100	100	91.7	100	70	6.50	99	60
R-40244(DOR)	4.0	100	100	0	13.3	100	100	96	100	96.7	4.37	100	0
buthidazole(50W)(DOR)	.5	100	100	0	0	100	100	0	100	95	5.55	97	150
buthidazole(50W)(DOR)	.75	100	100	0	0	100	100	0	100	100	3.97	100	0
buthidazole(5G)(DOR)	.5	100	100	30	16.7	100	100	0	100	100	5.39	99	40
buthidazole(50W)(ACT)[6]	.5	100	100	0	0	100	100	0	100	100	4.10	95	230
buthidazole(50W)(ACT)	.75	100	100	0	0	100	100	0	100	100	4.87	100	0
buthidazole(5G)(ACT)	.5	100	100	16.7	11.7	100	100	0	100	95	4.93	85	680
simazine(80W)(DOR)	1.0	100	100	0	0	96.7	100	0	100	33.3	5.93	99+	10
simazine(80W)(ACT)	1.0	100	100	3.3	0	23.3	33.3	0	60	0	4.22	72	1240
terbacil(80W)(DOR)	.5	100	100	0	0	100	100	0	100	100	5.06	100	0
terbacil(80W)(ACT)	.5	100	100	0	0	100	100	0	100	98.7	4.64	99+	10

1/Forage yield includes the biomass of the alfalfa and perennial grasses combined.
2/Grass.
3/Alfalfa.
4/Vigor reduction.
5/Dormant application.
6/Application made when forage crop actively growing.

Wild oat control in spring barley. Morishita, D. W., G. A. Lee, W. J. Schumacher, and W. S. Belles. This study was conducted near Moscow, Idaho to determine the effectiveness of postemergence herbicides for wild oat control in spring barley (cultivar: Kimberly). Plots were 9 by 30 ft with treatments replicated three times in a randomized complete block design. The herbicides were applied with a knapsack sprayer equipped with a 3 nozzle boom calibrated to deliver 20 gpa total volume with water as the carrier with the exception of barban which was applied at 5 gpa total volume. Postemergent herbicide applications were made at the two-to-three-leaf stage of wild oat growth on June 19, 1979. At the time of herbicide application, air temperature was 66 F, relative humidity 72%, and the sky was overcast. Soil temperatures at 4 and 6 inch depths were 78 and 70 F, respectively. Late postemergence herbicide applicatons were made at the five-leaf stage of wild oat growth on July 9, 1979. At the time of this herbicide application, air temperature was 77 F, relative humidity 60%, and the sky was partially overcast. Soil temperatures at the 4 and 6 inch depths were 82 and 74 F, respectively. The soil type at the study site was Palouse silt loam. Crop injury and weed control was determined visually. Yield data for each treatment were obtained by harvesting a 114.2 sq ft area of each plot with a Hege plot combine.

SD-45328 at .4 lb/A, split application of barban at .375/.375 lb/A, diclofop-methyl + R-40244 at .5 + .5 lb/A and barban at .375 lb/A resulted in the highest control of wild oats. The addition of 2,4-D amine and bromoxynil to SD-45328 reduced wild oat control. Plots treated with a split application of barban at .375/.375 lb/A, barban at .375 lb/A, and barban + R-40244 at .5 + .5 lb/A resulted in substantially higher yields than the non-treated check plots. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Wild oat control in spring barley resulting from foliar applications of herbicides at Moscow, Idaho

Treatment	Rate lb/A	Crop SR[2]	Crop VR[3]	Wild Oat SR	Wild Oat VR	Bu/A	% yield by wt of check
check	-	0b	0d	0d	0d	25a-c	100ab
SD-45328(3-5)[1]	.1	0b	5cd	20cd	7cd	26a-c	108ab
SD-45328(3-5)	.2	0b	8bc	43a-c	12cd	25a-c	102ab
SD-45328(3-5)	.4	0b	3cd	75a	28ab	25a-c	102ab
2,4-D(amine) + SD-45328(3-5)	.5+.2	5a	5cd	35b-d	13cd	27ac	108ab
bromoxynil + SD-45328(3-5)	.5+.2	5a	7cd	20cd	13cd	26a-c	108ab
diclofop-methyl + R-40244(2-3)	.5+.5	2ab	13b	72a	33a	20b-c	87ab
difenzoquat + R-40244 (3-5)	.5+.5	0b	23a	32cd	12cd	19c	77b
barban + R-40244(2-3)	.5+.5	2a	3cd	67ab	18bc	32ab	130ab
barban(2-3)	.375	0b	2cd	72a	32a	33ab	134a
barban(3-5)	.375	5a	0d	20cd	5cd	27a-c	116ab
barban/barban (2-3)/(3-5)	.375/.375	0b	3cd	75a	27ab	34a	141a

[1] Wild oat leaf stage.

[2] SR=stand reduction.

[3] VR=vigor reduction.

Means followed by the same letter are not significantly different at .05 level by Duncan's new multiple range test.

Wild oats in Colorado. ZIMDAHL, R.L. and W.W. Donald. Wild oats appear annually in some spring barley fields but their extent and economic impact are unknown. Spring barley is one of the principal spring grains in Colorado with an annual value equal to that of the potato and exceeding the value of sorghum and dry beans. If wild oats are an important weed in barley as many believe, then they may be causing large yield and profit losses each year. This study was conducted to determine the extent and importance of the wild oat problem in Colorado.

In 1973 a survey was conducted among the fieldmen of the Adolph Coors Company and selected County agricultural agents to determine the extent of wild oat infestation in spring barley. The survey revealed that 62.5% of the spring barley acreage had some wild oats and 15% was so seriously infested that yields were reduced 50% or more. The same survey found that Barban and Triallate were the chief herbicides used by growers. In some areas of the state up to 95% of the growers were using herbicides whereas in others very few were using any chemicals at all.

Weed Scientists agree that wild oat competition reduces yield of spring grains, although there is debate concerning how injurious a particular density of wild oats may be and the influence of soil moisture, fertility and time of weed removal on yield. Studies in Canada have shown barley yield was reduced 41% by 720 wild oats per square yard when compared to plots with 80% weed control. In North Dakota barley was more competitive and more responsive to fertilizer than wheat. Eighty wild oats per square yard did not reduce barley yield on unfertilized plots but reduced yield 6.7 bu/A on unfertilized plots which was less than the effect of the same density on wheat. The addition of fertilizer almost eliminated the weed's effect on barley. On unfertilized plots 80 weeds per square yard reduced barley yield 26%. However, on fertilized plots the same weed density reduced wheat yield 41% whereas barley lost only 8.6%.

Our survey was concentrated in three northern Colorado counties, three southwestern counties, and five counties in the San Luis Valley because nearly 75% of the barley is grown in these portions of the state (Table 1). We visually surveyed a random sample of barley fields by driving on a predetermined route through the barley growing regions. When fields with wild oats were found several stand counts were made. The survey included 30% of the barley acreage in the state equalling 46,281 acres on 686 separate farms in the three areas. The number of farms with wild oats and the percent of the total number of farms surveyed is shown in Table 2. These data reveal that while Colorado has a wild oat problem, it is neither widespread nor serious in any area. It would seem that northern Colorado counties may have a more serious potential problem than the San Luis Valley or western slope growers. We also examined the influence of field or farm size on the wild oat problem. In general, fields were smaller in western slope and northern counties with an average size of less than 50 acres. The San Luis Valley is dominated by 130 acre fields under center pivot irrigation. No relationship between size of field and infestation of wild oats was found.

Thirty fields with an obvious wild oat problem were selected for yield determination. Four 1-meter square samples were taken from an area of the field infested with wild oats and four from an uninfested area of the same field. Stand counts of wild oats and yield of barley were determined. Table 3 shows the numbers of fields harvested in each county, the average and range of wild oat density, and the average yield with and without wild oats. These data indicate that wild oat densities of 100 per square meter or greater reduced yields. The average yield reduction was 27%. However, when one considers these data in light of the data in Table 2 which show that a small percentage of the total acres surveyed in each county was infested, one must question the seriousness of the wild oat problem.

The Colorado Agricultural Statistical Handbook for 1979 gives total barley acreage harvested in Colorado counties, average yield for each county, and the average price of $2.20/bu. From these data and the data herein the dollar loss due to wild oats in ten Colorado counties was estimated to be $578,000. The average loss per acre on 157,900 acres in the ten counties was only $3.66. The loss from wild oats was only 2.1% of 1978 total crop value of $27 million, which is negligible in most farming operations.

Our present conclusion is that there are some farmers in Colorado who do have a wild oat problem, which results in annual yield and profit losses. These farmers should take immediate measures to control their wild oat problem via cultural, mechanical or chemical means. For most other farmers the problem is either non-existent or latent. By this we mean that while wild oats are present in many fields they are present at levels too low to cause significant economic loss in the near future. However, they should not be neglected because wild oat populations can increase rapidly and represent a potential problem. An uncompleted phase of this study is a survey to ascertain wild oat control practices used by farmers. Preliminary results support the above conclusion in that most farmers do not utilize control measures for wild oats in barley and regard them as a minor problem. (Weed Research Laboratory, Department of Botany and Plant Pathology, Colorado State University, Fort Collins, CO 80523).

Table 1
Spring barley in Colorado
1978

Region of state	Acres planted X 1000	Percent of total
Northwest and mountain	9.9	3.5
Northeast	70.0	25.0
East central	42.0	15.0
Southwest	31.1	11.0
San Luis Valley (south central)	107.0	38.2
Southeast	17.6	6.3
Other	2.4	1.0
Total	280.0	100.0

Table 2
1979 - Wild oat survey - farms with wild oats

County	Number of farms with wild oats	Percent of total surveyed
Western Slope		
Delta	4	11
Mesa	0	
Montrose	10	10
San Luis Valley		
Alamosa	3	5
Conejos	1	6
Costilla	1	12
Rio Grande	9	9
Saguache	3	4
Northern Colorado		
Boulder	8	28
Larimer	19	22
Weld	10	6

Table 3
1979 Wild oat survey - harvested fields.

County	Number of fields	Average yield		Wild oat density/m^2	
		No wild oats	With wild oats	Average	Range
Northern Colorado					
Boulder	8	91.0	65.7	113	67-174
Larimer	3	95.2	70.0	123	64-189
Weld	3	75.8	52.3	164	47-372
Western Slope					
Delta	4	100.4	67.5	142	30-292
Montrose	2	99.5	76.5	188	104-272
San Luis Valley					
Alamosa	1	108.5	92.5	96	
Rio Grande	3	99.3	71.4	177	117-289
Saguache	6	103.3	72.0	191	71-294
Total	30				

Alachlor and metolachlor subsurface layer applications for yellow nutsedge control in large lima beans. Weakley, C.V., H.L. Carlson, P.P. Osterli and C.L. Elmore. In 1978, subsurface layer applications of alachlor and metolachlor were successful in controlling nutsedge in dry beans. As a result, a field study was conducted to evaluate the effect of subsurface layer applications of alachlor and metolachlor on the yield of large lima beans. The experiment was established on May 22, 1979 in Stanislaus, County, California on Vernalis loam soil. The plots were 1.5 m by 30.5 m and replicated four times in a randomized complete block design. The herbicides were applied at 608 l/ha with a CO_2 pressure sprayer equipped spray blade. The blade was pulled through the beds to create a subsurface layer of herbicide 1.58 cm below the soil surface.

Crop tolerance to the herbicide treatments was evaluated by means of a bean stand count on June 22, 1979. None of the treatments resulted in a significant reduction of bean stand, although overall stand was low due to poor soil moisture. Yellow nutsedge control was evaluated by counts taken on June 22, 1979 and July 20, 1979. All treatments gave excellent yellow nutsedge control at the initial evaluation date. Yellow nutsedge control had decreased to about 50% for all treatments by the second evaluation date. The trial was not harvested for yield determination because of the poor bean stand. (University of California Cooperative Extension, Davis, CA 95616)

Alachlor and metolachlor subsurface layer applications for yellow nutsedge control in large lima beans

Herbicide	Rate (Kg/ha)	Bean[1/] stand June 22, 1979	Nutsedge[2/] counts June 22, 1979	Nutsedge[2/] counts July 20, 1979
alachlor	1.1	142 a	4.5 b	128 b
alachlor	2.2	129 a	2.5 b	150 b
alachlor	4.5	130 a	0.8 b	129 b
metolachlor	1.1	135 a	3.5 b	153 b
metolachlor	2.2	122 a	0.3 b	146 b
metolachlor	4.5	130 a	0.3 b	137 b
untreated	-	143 a	60.0 a	300 a

1/ Stand per 61 m of row. Numbers are the average of four replications

2/ Counts taken within a 1.58 cm band over seedline for 61 m of row. Numbers are the average of four replications

Numbers followed by the same letter are not significantly different at the .05 level.

Evaluation of individual and herbicide combinations for weed control in drybeans. Alley, H. P. and N. E. Humburg. A field study was established at the Torrington Research and Extension Center to evaluate the weed control effectiveness of individual and/or herbicide combinations. Preplant herbicides were broadcast-applied on May 15, 1979 with a 6-nozzle knapsack sprayer in a total volume of 40 gpa water. Plots were 9 ft by 30 ft, arranged in a randomized complete block with three replications. The air temperature at time of application was 81 F, the relative humidity was 25% and soil temperatures were 90, 90, 78 and 66 F at the soil surface and 1, 2 and 4 inches, respectively. Herbicides were incorporated twice over with a finger-tine harrow. Beans (variety Pinto III) were planted 1.5 inches deep on 22-inch rows on May 16, 1979. Beans were row-irrigated from gated pipe. The soil was classified as a sandy loam (66.4% sand, 24.4% silt, 9.2% clay, with 1.8% organic matter and a 7.6 pH).

Percent weed control and bean stand were determined by counting weeds and beans in one 5-inch by 5-ft quadrat per replication on June 18, 1979. Bean yield was determined by harvesting the plots on September 10, 1979.

Herbicide combinations gave a better spectrum weed control than individual herbicides. The three-way combination of chloramben/EPTC/trifluralin was the outstanding treatment, giving 100% control of the weed spectrum. Combinations of chloramben/EPTC, pendimethalin/EPTC, metolachlor/EPTC, metolachlor/chloramben, ethalfluralin/EPTC and alachlor/chloramben gave 90% or greater control of weeds recorded on the experimental site. Profluralin appeared weak on hairy nightshade and common lambsquarters, alachlor and pendimethalin weak on common lambsquarters and metolachlor weak on common lambsquarters. Data definitely indicate the need and advantage of herbicide combinations for wide-spectrum weed control. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-989).

Effect of preplant incorporated herbicides on weed control, drybean stand and yield

Herbicides	Rate lb ai/A	Percent control[1] NS	PW	LQ	GRASS	Drybean % Stand	lb/A
chloramben/EPTC	1.5 + 3.0	91	100	100	92	100	2470
chloramben/EPTC	2.0 + 3.0	99	100	100	100	100	1950
chloramben/EPTC/trifluralin	1.5 + 3.0 + 0.5	100	100	100	100	100	2120
chloramben/EPTC/trifluralin	2.0 + 3.0 + 0.5	100	100	100	100	100	2580
pendimethalin	1.0	74	100	65	92	100	2420
pendimethalin/EPTC	0.75 + 2.0	90	100	85	92	100	2450
pendimethalin/EPTC	1.0 + 2.0	96	90	100	65	100	2200
metolachlor	2.0	71	90	15	92	100	1600
metolachlor/EPTC	1.25 + 2.0	96	100	100	81	100	2190
metolachlor/EPTC	1.25 + 3.0	100	100	65	100	97	1920
metolachlor/EPTC	1.25 + 4.0	97	90	100	100	100	2420
metolachlor/chloramben	1.25 + 2.0	94	100	85	100	100	1840
metolachlor/chloramben	1.5 + 2.0	91	100	35	92	100	2170
metolachlor/profluralin	1.5 + 0.5	87	100	15	92	100	1670
metolachlor/profluralin	2.0 + 0.5	83	100	50	65	100	1500
profluralin	0.5	26	90	15	73	97	1120
profluralin/EPTC	0.5 + 2.0	90	100	50	100	100	1940
ethalfluralin	0.5	64	100	65	92	100	1560
ethalfluralin	0.75	90	100	100	100	100	1840
ethalfluralin/EPTC	0.5 + 2.0	90	90	100	100	100	1610
ethalfluralin/EPTC	0.75 + 2.0	100	90	100	92	97	1760
alachlor	3.0	96	100	65	81	100	1420
alachlor/trifluralin	2.5 + 0.5	88	100	65	92	100	1790
alachlor/chloramben	2.5 + 1.5	94	100	100	100	89	1700
Check	---	0	0	0	0	100	930
plants/ft of row, 6 in. band		*2.3*	*0.26*	*0.19*	*0.37*	*0.9*	

[1]Abbreviations: NS = hairy nightshade; PW = redroot pigweed; LQ = common lambsquarters; GRASS = green foxtail and barnyardgrass.

Evaluations of spring applied herbicides for weed control in pinto beans. Brenchley, R. G. Herbicide evaluation trials were established at the Southwest Idaho Research and Extension Center near Parma, Idaho, to evaluate potential herbicides for weed control in pinto bean (Kellogg variety 114) production fields. Herbicide applications were made May 5, 1979 (vernolate, cycloate, EPTC), May 15, 1979 (remaining PPI treatments), and June 20, 1979 (post treatments). Seeding date was May 21, 1979. Environmental conditions at the time of herbicide application were as follows: (May 5, 1979, air temperature 55 F, soil temperature 63 F, relative humidity 20%, wind SW 3 mph, cloud cover 100%, soil surface dry to 2 inches), (May 15, 1979, air temperature 85 F, soil temperature 59 F, relative humidity 20%, wind E 8 mph, cloud cover clear, soil surface dry to 6 inches), (June 20, 1979, air temperature 62 F, soil temperature 65 F, relative humidity 15%, wind NW 3 mph, cloud cover 30%, soil surface moist). Soil was a silt loam, 1.2% organic matter, pH 7.2, with a CEC of 14 meq. Plot size was 7 by 40 ft. Herbicide treatments were replicated four times in a randomized complete block design. Herbicide applications were made with a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 30 psi pressure which delivered 32 gpa total volume. All soil active herbicides were applied preplant incorporated. A power driven roto-tiller was used to incorporate the herbicides to a 2 to 3 inch depth.

Rainfall amount consisted of .82 inches on May 6 to 9, 1979, .24 inches June 18, 1979, 1.65 inches August 14, 1979. Plots were furrow irrigated on May 31, 1979, June 28, 1979, July 18, 1979, July 27, 1979, and August 4, 1979. Bean yields were taken September 13, 1979.

The weed species and density per square ft. (average of six sq. ft. per plot), six inches on either side of the bean row were redroot pigweed 38.4, common lambsquarters 9.7, hairy nightshade 6.9 and kochia 0.9. Weed control evaluations were taken June 25, 1979.

Outstanding treatments were generally those in which one of the herbicides in combination was of the dinitroaniline chemistry for example EPTC + trifluralin, alachlor + trifluralin, metolachlor + trifluralin and ethalfluralin. Generally speaking these chemicals (dinitroanilines) gave excellent control of redroot pigweed, common lambsquarters, and kochia. Their most noted weakness was control of hairy nightshade. Ethalfluralin was the exception giving excellent control of all weed species present. Hairy nightshade, which is perhaps our most problematic weed in field beans because few herbicides give excellent control consistently, was controlled better than 90% of the time in these trials with cycloate, ethalfluralin, bentazon, and metolachlor (see attached table). (University of Idaho, SW Idaho Research and Extension Center, Parma, Idaho 83660)

Influence of spring applied herbicides on percent weed control and bean yield in 1979 at Parma, Idaho.

Treatment[1/]	Rate	Bean		Percent Control[2/]				Bean Yield
	lb/A	% Stand	% Stunt	PW	LQ	HNS	KO	lbs/A
Vernolate	3.0	100	5	82	82	35	81	1348
Vernolate	4.0	100	13	84	87	36	57	1303
Cycloate	3.0	100	3	57	79	97	0	1692
Cycloate	4.0	100	10	80	84	97	0	1530
EPTC	3.0	100	9	48	33	45	52	1400
EPTC	4.0	100	11	69	31	54	57	843
EPTC + Trifluralin	2.0+0.5	100	9	100	100	94	100	2570
Trifluralin	0.75	100	23	100	100	52	100	2279
Profluralin	0.75	100	3	94	98	43	100	1567
Dinitramine	0.5	100	11	93	95	71	100	2018
Ethalfluralin	1.5	86	9	100	100	95	100	2646
Ethalfluralin	3.0	100	7	100	99	99	100	2688
Alachlor	3.0	100	14	97	85	78	81	1926
Alachlor + Trifluralin	2.5+0.5	100	10	100	100	87	100	2921
Metolachlor	2.5	96	4	94	66	92	20	1427
Metolachlor + Trifluralin	2.0+0.5	98	24	99	100	90	100	2123
Chloramben	2.0	100	7	66	37	24	20	1383
Fison-20484	1.5	100	8	95	66	71	67	1583
Fison-20484	3.0	100	26	98	73	83	95	1430
Diclofop + Diclofop (PPI+Post)	1.5+1.0	100	10	26	18	27	29	755
Diclofop + Bentazon (Post)	1.0+0.75	100	21	56	71	95	75	1196
Bentazon (Post)	0.75	100	19	58	75	99	53	1371
Handweeded Check		100	0	100	100	100	100	3174
Weedy Check		100	19	0	0	0	0	200

[1/] All treatments applied preplant incorporated unless otherwise noted.

[2/] PW = redroot pigweed; LQ = common lambsquarters; HNS = hairy nightshade; KO = kochia

Comparison of preplant incorporation and subsurface layering of herbicides for yellow nutsedge control in kidney beans. Weakley, C.V., H.L. Carlson, R.J. Mullen, W.M. Canevari and C.L. Elmore. A field study was conducted to compare the effects of preplant incorporation and subsurface layering of alachlor, EPTC and metolachlor for yellow nutsedge control in red kidney beans. The experiment was established on June 8, 1979 in San Joaquin County, CA on clay loam soil. The plots were 1.5 m by 30.5 m and replicated four times in a randomized complete block design. The preplant incorporated herbicide treatments were applied at 355 l/ha with a CO_2 pressure sprayer and incorporated into the soil to a depth of 3.8 cm with a rolling cultivator. The subsurface layered treatments were applied at 608 l/ha with a CO_2 pressure sprayer equipped spray blade pulled through the soil at a depth of 11.4 cm.

Crop tolerance to the herbicide treatments was evaluated by means of a bean emergence rating on June 20, 1979 and a crop vigor rating on July 9, 1979. The subsurface layered treatments caused a delay in bean emergence compared to the preplant incorporated treatments. This delay may be attributed to planting depth as the seed was planted deeper in the subsurface layered beds. The beans in the preplant incorporated plots were slightly more vigorous at the date of evaluation than the beans in the subsurface layered plots. This may be due to the differential bean emergence. Weed control was evaluated by means of an annual weed control rating on July 9, 1979 and yellow nutsedge counts on July 9, 1979, and July 25, 1979. There was little difference in annual weed control, but the subsurface layer gave better control in the EPTC, metolachlor and untreated comparisons. At the first evaluation date, the subsurface layer gave much better yellow nutsedge control than the preplant incorporated technique. By the second evaluation date this difference had disappeared in all but the EPTC and untreated comparisons. At the second evaluation date, both 4.5 Kg/ha alachlor and metolachlor treatments and the subsurface layered EPTC treatment continued to give very good yellow nutsedge control. The 2.2 Kg/ha alachlor and metolachlor treatments gave better yellow nutsedge control than the untreated controls. The preplant incorporated EPTC treatment did not give adequate yellow nutsedge control. In the untreated comparison, the subsurface layer technique gave about a 50% yellow nutsedge reduction over the preplant incorporated technique. The plots were harvested for yield determination on October 18, 1979. There was no significant difference in yield between treatments. (University of California Cooperative Extension, Davis, CA 95616)

Comparison of preplant incorporation and subsurface layering of herbicides for yellow nutsedge control in red kidney beans

Herbicide	Rate (Kg/ha)	PPI or SSL	Bean[1/] emergence 6/20/79	Crop[2/] Vigor 7/9/79	Annual[3/] weed control rating 7/9/79	Nutsedge[4/] counts 7/9/79	Nutsedge[5/] counts 7/25/79	Yield[6/] (Kg/ha)
alachlor	2.2	PPI	9.5	9.4	8.0	111	74 c	1190 a
alachlor	2.2	SSL	7.0	8.8	8.0	72	71 c	1320 a
alachlor	4.5	PPI	9.5	9.5	8.5	54	29 d	1170 a
alachlor	4.5	SSL	6.3	8.9	8.9	17	25 d	1170 a
EPTC	2.2	PPI	9.5	9.3	7.1	259	100 bc	1320 a
EPTC	2.2	SSL	6.8	8.7	8.4	17	18 d	1420 a
metolachlor	2.2	PPI	10.0	9.5	7.4	199	87 c	1220 a
metolachlor	2.2	SSL	5.8	9.0	8.3	43	38 cd	1280 a
metolachlor	4.5	PPI	9.3	9.4	8.1	42	17 d	1270 a
metolachlor	4.5	SSL	5.5	8.6	8.9	14	11 d	1330 a
untreated	-	PPI	8.8	9.5	3.7	545	290 a	1120 a
untreated	-	SSL	5.8	8.9	4.8	218	152 b	1180 a

1/ 10 = complete emergence; 0 = no emergence. Numbers are the average of four replications

2/ 10 = vigorous; 0 = death. Numbers are the average of four replications

3/ 10 = 100% control; 0 = no control. Rating based on mustard and barnyardgrass control. Numbers are the average of four replications

4/ Counts of bed top for 61 m of row. Numbers are the average of four replications

5/ Counts taken in a 10.2 cm band over seedline for 61 m of row. Numbers are the average of four replications

6/ Numbers are the average of four replications

Numbers followed by the same letter are not significantly different at the 0.05 level

Preplant incorporated herbicide screening trial in kidney beans. Weakley, C.V., H.L. Carlson, C.L. Elmore. A field study was conducted to evaluate two new preplant herbicides for control of annual weeds in kidney beans. PPG 378 was evaluated at 2.2 and 4.5 kg/ha and NC 20482 was tested at 1.7 and 3.4 kg/ha. In addition, the effectiveness of PPG 650, an experimental EPTC - extender combination, was evaluated at rates of 2.2 and 3.4 kg/ha. These new herbicides were compared to standard commercial and experimental herbicide treatments of alachlor, dinitramine, ethalfluralin, metolachlor and trifluralin. The experiment was established on May 22, 1979 on Yolo fine sandy loam soil. The plots were 1.5 m by 6.1 m and replicated four times in a randomized complete block design. The herbicides were applied at 470 l/ha with a CO_2 pressure sprayer and incorporated into the soil to a depth of 5 cm with a power tiller.

Crop tolerance to the herbicides was evaluated by means of a bean stand count taken on June 13, 1979, and by a crop vigor rating on June 19, 1979. None of the treatments resulted in a significant reduction of bean stand or vigor. The plots were evaluated for barnyardgrass control on July 5,1979. Ethalfluralin, dinitramine, alachlor, metolachlor, and trifluralin all provided very good barnyardgrass control. Of the two new materials, NC 20484 looked the best giving very good barnyardgrass control at the 3.4 kg/ha rate. PPG 378 did not give adequate barnyardgrass control at either of the two rates tested. PPG 650 (EPTC plus extender) did not show a significant improvement in barnyardgrass control compared to EPTC alone (EPTAM or PPG 1030). (University of California Cooperative Extension, Davis, CA 95616)

Preplant incorporated herbicide screening trial in kidney beans

Treatment	Rate (kg/ha)	Bean Stand[1] 6/13/79	Crop Vigor[2] 6/19/79	Barnyardgrass[3] control 7/5/79
PPG 1030 (EPTC)	2.2	128 a	8.8 a	7.3 b
PPG 1030 (EPTC)	3.4	141 a	8.0 a	8.3 ab
PPG 650 (EPTC + ext)	2.2	125 a	8.8 a	8.3 ab
PPG 650 (EPTC + ext)	3.4	104 a	8.3 a	8.0 ab
EPTC (EPTAM)	2.2	137 a	9.3 a	7.8 ab
EPTC (EPTAM)	3.4	115 a	8.5 a	8.8 ab
PPG 378	2.2	122 a	8.0 a	4.8 c
PPG 378	4.5	119 a	7.0 a	2.5 d
NC 20484	1.7	116 a	8.3 a	8.3 ab
NC 20484	3.4	115 a	8.8 a	9.8 a
ethalfluralin	1.7	148 a	8.8 a	10.0 a
dinitramine	0.56	124 a	8.3 a	9.5 a
alachlor	3.4	120 a	8.5 a	9.8 a
metolachlor	3.4	128 a	8.5 a	9.8 a
trifluralin	0.8	119 a	8.5 a	8.8 ab
untreated	-	118 a	8.3 a	0 e

[1] Numbers are the average of four replications

[2] 10 = 100% vigor, 0 = death; numbers are the average of four replications

[3] 10 = 100% control, 0 = no control; numbers are the average of four replications

Means followed by the same letter are not significantly different at the .05 level

Comparison of preplant incorporation and subsurface layering of alachlor in kidney beans. Weakley, C.V., H.L. Carlson and C.L. Elmore. A field study was conducted to compare the effect of preplant incorporation and subsurface layering of alachlor on the yield of red kidney beans. The experiment was established on May 30, 1979 on Yolo fine sandy loam soil. The plots were 1.5 m by 24.4 m and replicated five times in a randomized complete block design. The preplant incorporated herbicide treatments were applied at 468 l/ha with a CO_2 pressure sprayer and incorporated into the soil to a depth of 6.3 cm with a power tiller. The subsurface layered herbicide treatments were applied at 608 l/ha with a CO_2 pressure sprayer equipped spray blade pulled through the soil at a depth of 10.2 cm.

Crop tolerance to the herbicide treatments was evaluated by means of a bean stand count on June 20, 1979. None of the treatments resulted in a significant reduction of bean stand. The plots were harvested for yield determination on September 6, 1979. There was no significant yield difference between the treatments at the .05 level. (University of California Cooperative Extension, Davis, CA 95616)

Comparison of preplant incorporation and subsurface layering of alachlor in red kidney beans

Herbicide	Rate (Kg/ha)	PPI or SSL	Bean[1/] stand June 20, 1979	Yield[2/] (kg/ha)
alachlor	3.4	SSL	123 a	2930 a
alachlor	6.7	SSL	123 a	3180 a
alachlor	3.4	PPI	124 a	2960 a
alachlor	6.7	PPI	127 a	3060 a
trifluralin	0.84	PPI	129 a	2970 a
untreated	-	-	130 a	3210 a

1/ Stand per 48.8 m of row. Numbers are the average of four replications

2/ Numbers are the average of four replications

Numbers followed by the same letter are not significantly different at the .05 level

Herbicides applied by center-pivot sprinkler for weed control in field corn. Humburg, N. E. and H. P. Alley. Herbicides were injected into the mainline of a center-pivot sprinkler system with a piston pump at a centrally located well. Rate of water application was 0.55 in for EPTC and 0.4 in for other treatments. Applications were made on May 30 and 31, 1979. The ranges of environmental conditions during treatment were: air temperature, 41 to 54 F; relative humidity, 64 to 100%; and partly cloudy to overcast skies. The loamy sand soil (87% sand, 7% silt and 6% clay) had 6.9 pH and 0.9% organic matter. Treatments were not replicated.

Weed counts were made on June 28, 1979 at 10 sites per herbicide-treated area. Wild buckwheat and field sandbur were the principal weeds; populations ranged from 1.6 to 12.6 plants/sq ft for wild buckwheat and 0.4 to 12.4 plants/sq ft for field sandbur. Control of wild buckwheat ranged from 98 to 100%. Control of field sandbur was variable, with alachlor + atrazine, EPTC, metolachlor + atrazine and alachlor + cyanazine providing 96, 94, 80 and 57% control, respectively. Corn yield samples were harvested Sept. 5, 1979, with areas treated with metolachlor + atrazine, alachlor + cyanazine and alachlor + atrazine producing one- to two-thirds more forage than untreated areas. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-990).

Herbicides applied by center-pivot sprinkler for weed control in field corn

Treatment[1]	Rate lb/A	Percent control[2] BW	Percent control[2] SB	Corn forage[3] ton/A
EPTC (+ R-25788)	4.0	98	94	19.9
untreated check *(plants/sq ft)*		*(1.6)*	*(2.0)*	19.4
metolachlor + atrazine	1.5 + 1.2	99	80	26.5
untreated check *(plants/sq ft)*		*(7.6)*	*(0.4)*	18.4
alachlor + cyanazine	2.5 + 1.0	99	57	26.6
untreated check *(plants/sq ft)*		*(12.6)*	*(1.0)*	15.6
alachlor + atrazine	2.5 + 1.0	100	96	25.4
untreated check *(plants/sq ft)*		*(2.4)*	*(12.4)*	19.1

[1]Herbicides applied May 30-31, 1979.
[2]Weed counts June 28, 1979. Abbreviations: BW = wild buckwheat; SB = field sandbur.
[3]Harvested Sept. 5, 1979.

Evaluation of spring applied herbicides for weed control in field corn. Brenchley, R. G. Plots were established at the Southwest Idaho Research and Extension Center near Parma, Idaho, to evaluate potential herbicides for weed control in field corn (Funk's variety 4195). Herbicide applications were made May 24, 1979 (preplant incorporated), June 1, 1979 (preemergence) and June 2, 1979 (post emergence). Environmental conditions at time of application were as follows: (May 24, 1979, air temperature 76 F, soil temperature 68 F, relative humidity 15%, wind NW 8 mph, cloud cover 15%, soil surface dry to six inches), (June 1, 1979, air temperature 80 F, soil temperature 63 F, relative humidity 12%, wind NW 3 mph, cloud cover clear, soil surface at field capacity), (June 20, 1979, air temperature 64 F, soil temperature 63 F, relative humidity 15%, wind NW 2 mph, cloud cover 30%, soil surface moist to six inches). Soil type was a silt loam, 1.2% organic matter, pH 7.2, with a CEC of 15 meq. Plot size was 7 by 40 ft. Treatments were replicated four times in a randomized complete block design. Herbicide applications were made using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 30 psi pressure with a delivery rate of 32 gpa total volume. Herbicides were incorporated to three inches using a power roto-tiller. Crop was planted May 29, 1979 and harvested on October 9 and 10, 1979.

Rainfall amounts consisted of .82 inches on May 6 to 9, .24 inches on June 18, 1.65 inches on August 14, 1979. Plots were furrow irrigated on May 18, June 12, June 28, July 17, July 28, and August 3, 1979.

Weed species and density per square foot (average of six sq. ft. per plot) six inches on either side of the corn row were redroot pigweed 21.7, hairy nightshade 7.4 and common lambsquarter 1.3. Weed control evaluations were taken June 28, 1979.

Treatments which resulted in 90% plus control of redroot pigweed, common lambsquarter, and hairy nightshade and producing yield comparable to the handweeded check were alachlor + atrazine, metolachlor + atrazine, metolachlor + cyanazine, butylate + cyanazine, EPTC + R-25788 + cyanazine, alachlor + cyanazine and metolachlor + bentazon. Comparison studies where alachlor, metolachlor and cyanazine were applied preplant incorporated vs preemergence showed soil incorporation of all three compounds was beneficial. Vernolate gave excellent control of redroot pigweed and common lambsquarter but was extremely weak on hairy nightshade. Vernolate should be used with a safening agent since corn injury is a serious possibility. (University of Idaho, SW Idaho Research and Extension Center, Parma, ID 83660)

Weed control and corn tolerance results from spring applied herbicides in 1979 at Parma, Idaho

Treatment	Method of Application[3/]	Rate lb/A	Corn % Stand	Corn % Stunt	Percent Control[4/] PW	Percent Control[4/] LQ	Percent Control[4/] HNS	Yield[5/] bu/A
Butylate	PPI	3.0	100	0	34	10	0	86.6
Butylate	PPI	4.0	100	0	69	0	0	100.2
Butylate + Cyanazine	PPI	3.0+1.5	100	0	99	100	99	125.6
Vernolate	PPI	3.0	100	20	96	100	0	104.8
Vernolate	PPI	4.0	85	35	96	97	0	85.2
EPTC + R-25788[1/]	PPI	4.0	100	0	72	58	76	112.6
EPTC + R-25788[1/]	PPI	6.0	100	0	85	65	87	114.8
EPTC + R-25788 + Cyanazine[1/]	PPI	3.0+1.5	100	0	99	97	98	124.7
Alachlor	PPI	3.0	100	0	98	77	93	104.1
Alachlor	P.E.	2.5	100	0	71	0	0	85.7
Alachlor + Cyanazine	PPI	2.0+1.5	100	0	99	100	100	122.1
Alachlor + Atrazine	PPI	2.0+1.25	100	0	100	100	100	148.7
Metolachlor	PPI	2.5	92	10	80	65	64	86.2
Metolachlor	P.E.	2.0	100	0	21	4	0	91.7
Metolachlor + Cyanazine	PPI	1.5+1.2	100	0	99	97	99	132.5
Metolachlor + Atrazine[2/]	PPI	1.5+1.2	100	0	99	100	96	140.9
Metolachlor + Bentazon	PPI+Post	2.5+0.75	100	0	97	87	99	128.6
Cyanazine	PPI	2.5	100	0	98	97	99	92.0
Cyanazine	P.E.	2.0	100	0	58	0	62	86.3
Bentazon	Post	0.75	100	0	61	87	0	111.4
Handweeded Check			100	0	100	100	100	127.2
Weedy Check			100	0	0	0	0	36.0

[1/] EPTC + R-25788 = Eradicane (Rate = amount of EPTC)

[2/] Prepackage mix by Ciba Geigy called Bicep

[3/] PPI = Preplant incorporated; PE = preemergence; Post = post emergence

[4/] PW = redroot pigweed; LQ = common lambsquarter; HNS = hairy nightshade

[5/] Expressed as bushel/acre of shelled corn at 15.5% moisture

Control of field sandbur in sprinkler-irrigated field corn. Humburg, N. E. and H. P. Alley. Corn was planted and preemergence herbicide applications were made on May 24, 1979. Each treatment was replicated three times; nine by 25 ft plots were arranged in randomized complete blocks. Air temperature was 78 F and relative humidity 30%. Surface soil temperature was 97 F. Postemergence treatments were made on June 13, 1979 between 8:35 and 9:00 p.m. MDT. Corn was in the 1-leaf stage of growth and 4 to 6-in tall. Field sandbur had 1 to 2 leaves and was 1 to 3-in tall. Environmental conditions were: air temperature, 71 F; relative humidity, 72%; clear sky; and surface soil temperature, 71 F. The sand soil (88.2% sand, 6.6% silt and 5.2% clay) had 0.9% organic matter and 7.1 pH.

Field sandbur plants were counted on June 28 to determine percentage control. Control by preemergence-applied herbicides 35 days after treatment ranged from 24 to 93%. Late-season control was evaluated by visual ratings on Sept. 5, 1979. The range of control values was from 53 to 93% for preemergence treatments. Treatments containing a triazine herbicide, particularly atrazine, generally gave good control of field sandbur irrespective of application technique. Postemergence treatments of metolachlor, metolachlor + atrazine, and atrazine were comparable in performance to preemergence and preemergence plus postemergence treatments. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-991).

Control of field sandbur in sprinkler-irrigated field corn

Treatments[1/]	Rate lb ai/A	Field sandbur control[2/] June 28 %	 Sept. 5 %
Preemergence			
metolachlor	2.0	93	53
metolachlor	3.0	79	74
metolachlor	4.0	31	73
metolachlor + atrazine	1.25 + 1.0	59	75
metolachlor + atrazine	1.5 + 1.2	62	78
metolachlor + atrazine	1.75 + 1.4	24	83
metolachlor + atrazine	2.0 + 1.6	55	82
metolachlor + cyanazine + atrazine	1.25 + 0.67 + 0.33	79	74
metolachlor + cyanazine + atrazine	1.27 + 0.8 + 0.4	83	73
cyanazine + atrazine	1.0 + 1.0	38	77
alachlor + atrazine	2.5 + 1.0	72	92
alachlor + atrazine	3.0 + 1.6	93	93
AC-206784 + atrazine	3.5 + 1.0	83	88
RE-28269	2.0	24	72
Postemergence			
metolachlor + atrazine	1.25 + 1.0	--	61
metolachlor + atrazine	1.5 + 1.2	--	88
atrazine	2.0	--	86
Preemergence [+ Postemergence]			
alachlor [+ alachlor]	3.0 [+ 1.0]	52	80
alachlor + atrazine [+ alachlor]	2.0 + 1.0 [+ 1.0]	86	85
Check			
no treatment	---	0	0
plants/sq ft		*2.0*	

1/ Herbicide application dates: preemergence, May 24; postemergence, June 13, 1979.

2/ Weed counts, June 28, 1979. Visual evaluations, Sept. 5, 1979.

Fluridone (EL-171) for selective weed control in cotton. Anderson, W. Powell and Gary Hoxworth. Based on two years field research, fluridone appears to be a highly effective herbicide for the selective control of annual and perennial weeds in cotton. However, fluridone persisted in the soil in herbicidal amounts for at least 18 months following applications of dosages as low as 0.5 lb ai/A.

Applied preplant, soil incorporated about 2 inches deep, in 1978 at dosages of 0.5, 0.75, and 1.0 lb ai/A, replicated 4 times, and in 1979 at dosages of 0.125, 0.25, 0.33, 0.50, 0.75, and 1.0 lb ai/A, replicated 3 times, fluridone provided complete, season-long, control of all annual grass and broadleaved weeds -- including the lowest dosage (0.125 lb ai/A) and complete to almost complete (97% or better), season-long, control of the perennial weeds yellow nutsedge and established johnsongrass at dosages as low as 0.25 lb ai/A. Individual plot size was 10 ft (3 rows of cotton) wide by 40 feet long.

Applied preemergence in 1978 at dosages of 0.5, 0.75, and 1.0 lb ai/A, replicated 4 times, fluridone did not control annual morningglories -- principally woolly (Mexican) morningglory and tall morningglory. These weed species emerged through the layer of fluridone-treated soil and submerged the cotton plants with their vining vegetation. However, other annual weeds normally present in the treated areas were completely controlled for the season by these treatments.

Under the irrigated, low rainfall conditions of southern New Mexico, fluridone soil-residues were still highly herbicidal 18 months after applications of 0.5, 0.75, and 1.0 lb ai/A preplant in March and preemergence in April of 1978. These soil-residues were still providing complete weed control in the treated areas when evaluated as late as September 1979, except for a few plants of yellow nutsedge present in these areas.

Cotton plants appeared not to be adversely affected by fluridone when applied either preplant or preemergence at dosages as high as 1.0 lb ai/A, except for some chlorosis of the oldest (lower 2 or 3) leaves on plants in the 1.0 lb ai/A treated areas. Yield data taken in 1979 indicate that fluridone, applied preplant at dosages ranging from 0.125 to 1.0 lb ai/A, had no adverse effect on yields of seed-cotton.

Weed species present in untreated plots within the experimental area included barnyardgrass, junglerice, southwestern cupgrass, Mexican sprangletop, carelessweed, fringed pigweed, woolly morningglory, tall morningglory, spurred anoda, Wright groundcherry, yellow nutsedge, seedling johnsongrass and a scattering of established johnsongrass. Unless otherwise noted, fluridone treatments resulted in complete control of the weed species. (Agricultural Experiment Station and Department of Agronomy, New Mexico State University, Las Cruces, NM 88003.)

Response of cotton to glyphosate applied as a spray and by a rope wick. Hamilton, K. C. and C. Doty. We compared the response of cotton to glyphosate applied as a over-the-top broadcast and applied to the top of plants with a rope wick at Phoenix, Arizona. On June 13, 1979 when cotton was 16 inches high three rates of glyphosate in 40 gpa of water was spray broadcast over cotton plants. Four concentrations of glyphosate were applied to the top 2 inches of cotton plants as a one-way wipe with a rope wick. The concentrations were 1:1 to 1:4 dilutions of a 3 lb/gal formulation of glyphosate with water. The wick was 0.25 inch pipe with 0.04 inch holes at 2 inch intervals wrapped with 0.25 inch braided cotton rope. Treated plots were four rows, 42 feet long, and treatments were replicated four times.

All concentrations of glyphosate applied with the wick and 12 oz/A of glyphosate sprayed over cotton caused foliage symptoms and stunted cotton (see table). In August cotton growth appeared normal with all treatments. Although glyphosate applied to cotton top growth with a wick caused temporary stunting, it appeared to have less effect on yield than 8 and 12 oz/A of glyphosate applied as a spray to the foliage on the same day. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Cotton stunting and yield after glyphosate was applied broadcast and with a rope wick.

Treatment		Stunting July	Yield of seed cotton
Method	Rate of glyphosate		lb/A
Untreated		0	1,450
Wick	1:1 Glyphosate:water	50%	1,340
Wick	1:2 Glyphosate:water	50%	1,300
Wick	1:3 Glyphosate:water	50%	1,420
Wick	1:4 Glyphosate:water	50%	1,790
Spray	4 oz/A	0	1,480
Spray	8 oz/A	0	1,170
Spray	12 oz/A	50%	950

Post-emergence herbicides and herbicide application techniques evaluated for rhizomatous johnsongrass control in cotton. Kempen, H. and J. Graf. A number of potentially effective post-emergence herbicides for rhizomatous johnsongrass were evaluated in Kern County, California in 1979. Also, glyphosate herbicide applied through a rope-wick applicator was used as a technique for controlling johnsongrass post-emergence. An effective low cost method is needed to control johnsongrass from rhizomes in cotton because the preplant and preemergence herbicides will control johnsongrass seedlings but not those from rhizomes.

Chevron KK-80, BASF 9052 OH, MBR 18337 and dalapon were applied postemergence to cotton at two different application dates. A split plot design was used. On the first application date of May 10, 1979 the cotton was 3 to 4 inches tall and the johnsongrass was 4 to 10 inches tall (2 to 6 leaves). On this date the farmer cooperator hoed that portion of the field outside of the plots. Of all treatments and treatment dates, the farmer's field had the best control and most vigorous cotton so it is included as a check against which all post-emergence treatments were compared. A second treatment date was made on June 19, 1979. The cotton in the plots was 10 to 15 inches tall and the johnsongrass was from early regrowth to mature and heading.

Results of this test indicate that vigor reduction measured by cotton height reflects johnsongrass competition strongly. Severe cotton vigor reduction due to herbicide injury was caused by dalapon; and MBR 18337 gave leaf abnormalities but overall vigor was not reduced drastically. The results indicate that the earliest application date is the most important because of cotton's release from johnsongrass competition, especially in lieu of the hoed field where cotton vigor was excellent from lack of early competition. Of the herbicides used, BASF 9052 OH gave 70% control at 1.0 and 2.0 lb/A. Dalapon 74% at 10 lbs/A was essentially equal, but dalapon severely injured the cotton. At season's end, new growth from rhizomatous johnsongrass had reinfested both the farmer's field and test plots, so that single treatments were not commercially acceptable. These results suggest that further experiments with split applications of BASF 9052 OH at 1.0 or 2.0 lbs/A may be worth considering.

A rope-wick applicator was made after Dr. Jim Dale evaluated for glyphosate application for control of rhizomatous johnsongrass that grew above the cotton plants. The rope-wick system works when the weeds are taller than the crop. In cotton, this period would be as early as possible, as with post emergence sprays, because in the first two months the cotton is growing slowly and a larger percentage of the johnsongrass will be above it. After this the cotton will begin growing faster and a larger percentage of the johnsongrass will be within the cotton foliage.

Variables to consider with the rope-wick applicator is the concentration of glyphosate, speed of application and single vs. a double pass in apposite directions. Glyphosate was applied in a 25% and 50% solution (of formulated product) through the rope-wick at 2 vs. 4 mph tractor speed, and in a single vs. double pass. Little difference was noticed in comparing percentage glyphosate solution or tractor speed. However, the number of passes was important because of the shielding effect of large johnsongrass clumps. A pass in the reverse direction allowed application to that johnsongrass shielded in the first pass.

Initial control with the rope-wick gave 60 to 80% dieback of the johnsongrass. Within 3 to 4 weeks this control was reduced to 5 to 10% because of regrowth from that johnsongrass which had been within the cotton canopy of time of application. Repeated applications of up to 8 times, the last of which required high clearance equipment eventually gave reasonable control. However, because of the intense competition that johnsongrass provides cotton and the drastic yield reductions from it, it is felt that preventative programs which kill moderate infestations are most logical. An example is use of a dinitroaniline herbicide, early close cultivation, one hand weeding, followed by spot-spraying until all johnsongrass is dead.

The rope-wick system is seen as a good technique for salvage operations, and its use could be improved with better rope-wick type equipment. (Coop. Extension, Univ. of California, P.O. Box 2509, Bakersfield, Ca. 93303).

Comparison of ROCAP vs. preplant incorporated applications of herbicides into moist soil for yellow nutsedge control in cotton. Kempen, H. and J. Graf. Two experiments were conducted in Kern County, California on sandy loam soils with approximately 0.5% O.M. to evaluate various herbicides for control of yellow nutsedge in cotton. One experiment involved broadcast spraying of the herbicides followed by a field cultivator incorporation (PPI), listing beds, pre-irrigation, and planting into moist soil. The other experiment involved spraying the herbicides in a 20 inch band on pre-irrigated beds and immediately incorporating these herbicides with two gangs of Lilliston rolling cultivars attached ahead of a planter unit (ROCAP technique). Acala SJ-5 and SJ-2 cotton was planted respectively. No rainfall occurred after planting of cotton.

Herbicides that were compared for efficacy on yellow nutsedge under these different application and incorporation techniques are Dowco 295 at 1 and 2 lbs/A, diethatyl at 2 lbs/A, H 26910 at 2 lbs/A, fluridone at .19 and .38 lbs/A, RE-28269 at .5 and 1 lb/A and profluralin plus fluometuron at .5 plus .8 and 1 plus 1.6 lb/A. Other herbicides were included, but not in both experiments.

Results indicated that effectiveness in yellow nutsedge control of Dowco 295 at 1 and 2 lbs/A, RE-28269 at .5 and 1 lb/A, diethatyl and H 26910 at 2 lbs/A were extremely different due to incorporation technique. Dowco 295 at 1 lb/A ROCAP incorporated was as effective as Dowco 295 at 3 lbs. preplant incorporated. RE-28269 was much more effective PPI than ROCAP incorporated. H 26910 was much more effective preplant incorporated than its analog, diethatyl, was when ROCAP incorporated. Fluridone and the profluralin plus fluometuron treatments reacted essentially the same in both experiments.

Cotton tolerance was good for all treatments and both application-incorporation tehcniques. However some injury occurred after the first irrigation in ROCAP treatments.

Diethatyl, fluridone and RE-28269 were more effective after the first furrow irrigation on June 2, 1979 in the ROCAP experiment. Other herbicides not compared in these experiments, but which showed increased activity due to irrigation were NC-20484, DPX 4129 and MBR 18337. In most cases their yellow nutsedge control and toxicity to cotton was essentially doubled. Later ratings after irrigation were not taken on the PPI experiment, but observations showed no increased activity. Black and hairy nightshade were present in the PPI trial and was effectively controlled by Fluridone at .19, RE-28269 at 1.0, RE-28269 plus prometryn at .5 plus 1.6 and profluralin plus fluometuron at .5 plus 1.0. Dowco 295 and H 26910 testing will be terminated by Dow Chemical Company and Hercules because of high cost toxicology studies mandated by EPA, on other registered products. This, despite these two being the only preplant herbicides which showed excellent efficacy against nutsedges in the past 4 to 5 years of cotton research. (Cooperative Extension, University of California, PO Box 2509, Bakersfield, CA. 93303).

Comparison of ROCAP vs. PPI incorporations of several herbicides
for yellow nutsedge control in cotton

		Yellow Nutsedge Control 1/				Cotton injury	
	Rate	ROCAP		PPI		ROCAP	PPI
Treatments	lbs a.i./A	5-2-79	6-14-79 2/	5-2-79	5-23-79	6-14-79	5-26-79
Untreated	--	0.5	0.0	.7	0	1.0	1.3
Dowco 295	1	9.3	7.5	1.7	1.7	.3	.3
"	2	10.0	9.0	7.7	4.3	1.3	1.3
"	3	--	--	9.6	9.3	--	1.3
RE-28269	.5	0.0	5.0	7.8	5.0	1.3	2.0
"	1	6.0	6.0	8.9	9.8	1.0	.7
Fluridone	.19	3.5	7.5	3.5	1.8	.8	.3
"	.38	6.0	8.5	5.0	7.7	.5	1.3
Profluralin + fluometuron	.5 + 1.0	0.0	2.0	0.3	0.0	.8	.7
"	1 + 3.2	0.5	3.0	1.5	3.0	2.5	.7
Diethatyl	2.0	3.0	9.0	--	--	.5	--
H 26910	2.0	--	--	9.2	8.3	--	1.0

1/ Yellow nutsedge control 0-10: 0 = no control; 10 = complete control.
2/ Increased control here was often due to irrigation that had preceeded this reading. The water helped activate the herbicides.

Evaluation of preemergence and postemergence applied herbicides for broadleaf weed control in lentils. Baysinger, O. K., G. A. Lee and N. D. Fitzsimmons. Plots were established near Cavendish, Idaho, to determine the effectiveness of various preemergence and postemergence applied herbicides on broadleaf weed control in lentils(cultivar Tekoa). The crop was planted May 11, 1978. Wet and windy conditions prevailed until May 20, 1978 at which time, preemergence herbicides were applied as the lentils were emerging through the soil surface. The sky was clear and the wind was calm. Air temperature and relative humidity were 72 F and 50%, respectively. The soil temperature at 6 inches was 58 F with 1/2 inch clods on a 3% sloping surface. The soil at the study site was a sandy loam, with 2.0% OM with a high moisture content. On June 7, 1978 postemergence treatments were applied when the lentils were in the 4-leaf stage. Air temperature and relative humidity were 62 F and 84%, respectively. Wind velocity was 0-3 mph. Soil temperature at 6 inches was 66 F. All herbicides were applied with a knapsack sprayer, equipped with a 3-nozzle boom, calibrated to deliver 40 gpa. Individual plots were 9 ft. by 30 ft. Treatments were replicated three times in a randomized complete block design. Drought conditions existed from final treatment through harvest. Consequently, crop yields were depressed, and weed control was occasionally erratic. Percent lentil stand and percent weed control were obtained from actual species counts within an area 6 inches by 5 ft. There were two quadrat counts taken per plot. Numbers of plants in the treated plots were compared to numbers in the nontreated check plots. Yield determinations on lentils were made by hand pulling all lentils within two, 2 ft. by 5 ft. quadrats, drying the lentils for 2 weeks, and thrashing. Calculations of production were figured on pounds of dry lentils per acre.

Dinoseb (NH_2 salt) at 2.0 and 3.0 gal/A applied preemergence, gave excellent control of all weed species present (attached table). Dinoseb (NH_4 salt) at 1.0 gal/A applied preemergence gave excellent control of dog fennel, field pennycress, and sheperdspurse, but at the 3.0 gal/A rate, gave excellent control of all weed species present. R-40244 at .35 lb/A, and .5 lb/A applied preemergence, gave excellent control of mayweed, field pennycress, shephердspurse and henbit. R-40244 at .75 lb/A applied preemergence controlled all weed species present except bachelor button. The 1.0 lb/A rate of R-40244 applied preemergence controlled all weed species. R-40244 caused severe bleaching of all lentil plants present, beginning 3 days following treatment. Complete recovery of lentils was noted within 3 weeks resulting in excellent increases in yield over untreated check plots. Reduction in crop stand did not necessarily mean low production as evidenced by the postemergence treatment of dinoseb (NH_4 salt). (Idaho Agricultural Experiment Station, Moscow, ID).

Effect of preemergence and postemergence herbicides on broadleaf weeds and lentil yields

Treatment	Rate	% Crop stand	% Bachelor button control	% Dog fennel control	% Lambs-quarter control	% field penny-cress control	% sheperd purse control	% henbit control	Yield lbs/A	% yield by wt. of check
Check	0	–	–	–	–	–	–	–	147d	100d
propham	2.0 qt.	96ab[1]	65ac	79ab	53bd	57ac	47bc	55be	198d	133d
propham	3.0 qt.	90ab	61ac	66ab	8e	53ac	42bc	76ad	180d	110d
propham	4.0 qt.	70bc	39cd	64ab	7e	63ab	33bc	25e	252cd	184d
dinoseb (NH_4 salt)	1.0 gal.	68bc	87ab	99a	84ab	90a	99a	89ac	669a	435ab
dinoseb (NH_4 salt)	3.0 gal.	21c	95a	99a	96a	99a	99a	97ab	672a	448a
dinoseb (NH_2 salt)	2.0 gal.	50bc	99a	99a	96a	99a	99a	99a	321bd	228bd
dinoseb (NH_2 salt)	3.0 gal.	56bc	99a	99a	99a	99a	99a	99a	399ad	278ad
R-40244	.35 lb/A	71bc	86ab	99a	68ac	99a	99a	99a	637ab	444a
R-40244	.5 lb/A	44bc	88ab	99a	90a	99a	99a	98a	658a	453a
R-40244	.75 lb/A	53bc	89ab	97a	93a	99a	99a	99a	583ac	402ac
R-40244	1.0 lb/A	47bc	93a	99a	96a	99a	99a	99a	677a	313ad
dinoseb (NH_4 salt) (POST)	.5 lb/A	88ab	39cd	75a	41ce	96a	99a	85ac	413ad	290ad
dinoseb (NH_4 salt) (POST)	.75 lb/A	144a	37cd	4d	33ce	52ac	21bc	40de	290cd	198cd
dinoseb (NH_2 salt) (POST)	.75 lb/A	61bc	6d	0d	24de	15c	23bc	53ce	149d	111d
dinoseb (NH_2 salt) (POST)	1.5 lb/A	38bc	48bd	19cd	37ce	23bc	0c	30e	395ad	258ad
dinoseb (NH_2 salt) (POST)	2.25 lb/A	95ab	79ac	47bc	42ce	73ab	66ab	65ae	308bd	225bd

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

Control of wild oat in lentils. Handly, J. V., G. A. Lee, D. L. Auld and G. A. Murray. The trial was initiated to evaluate preplant and preemergence herbicides for wild oat control in lentils at Moscow, Idaho. Herbicide treatments were applied with a knapsack sprayer equipped with a three nozzle boom and calibrated to deliver 40 gpa. The preplant treatments were applied on May 22, 1979. A disc was employed to incorporate the herbicides to a depth of 2 inches. The implement was pulled at 3 mph in two directions over the plot area. Climatic conditions prevailing at the time were partially cloudy sky and air temperature 65 F. The lentil crop (cultivar common) was seeded at a rate of 60 lb/A on May 23. Preemergence surface herbicide treatments were applied on May 24. The sky was clear with an air temperature of 68 F and a 2 to 3 mph breeze. The soil type on the study site is a Palouse silt loam with a pH of 6.5 and 3.5% organic matter. The soil surface was cloddy (2 to 4 in diameter) at the time of herbicide applications. Visual evaluations of crop and wild oat stand and vigor were made on June 27, 1979. The plots were swathed prior to harvesting with a Hege plot combine.

No significant reduction in crop stand or vigor resulted from any of the herbicide treatments. Oxyfluorfen (PES) + triallate (PPI) at .25 + 1.25 lb/A and RH-8817 (PES) + triallate (PPI) at .5 + 1.25 lb/A gave 80 and 83% control of the wild oat population, respectively. Lentil yields were substantially higher in all plots treated with herbicides even though no significant differences were detectable. Lentil yield from plots treated with RH-8817 + triallate at .5 + 1.25 lb/A was 452 lb/A greater than yield from the nontreated check plots. Herbicide treatments resulted in increased lentil yield of 15 to 45%. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843.)

Crop tolerance and wild oat control in lentils at Moscow, Idaho, 1979

Treatment	Rate lb/A	Crop SR[1]	Crop VR[2]	Wild oat SR	Wild oat VR	Yield lb/A	Percent yield by weight of check
oxyfluorfen (PES) + triallate (PPI)	.25 + 1.25	3a	5a	80a	0a	1555a	136
RH8817 (PES) + triallate (PPI)	.25 + 1.25	7a	7a	50ab	0a	1576a	145
RH8817 (PES) + triallate (PPI)	.38 + 1.25	2a	3a	27b	0a	1301a	115
RH8817 (PES) + triallate (PPI)	.50 + 1.25	2a	2a	83a	3a	1644a	145
check	-	0a	0a	0b	0a	1192a	100

Means with the same letter are not significantly different at the .05 level.

[1] SR = Stand reduction

[2] VR = Vigor reduction

Tolerance of four lentil varieties to five herbicides. Handly, J. V., G. A. Lee, D. L. Auld, G. A. Murray. The investigation was initiated to determine the resistance or susceptibility of 4 lentil varieties to 5 postemergence herbicides. Each variety was planted on May 22, 1979 at the Plant and Soil Science Farm, Moscow, Idaho. All herbicides except barban were applied with a knapsack sprayer equipped with a three nozzle boom and calibrated to deliver 40 gpa. Barban was applied with the same equipment calibrated to deliver 5 gpa. Barban, diclofop-methyl, metribuzin, and HOE-23408 plus were all applied on June 11, 1979 when the lentils were 4 inches tall and had approximately 6 nodes. Difenzoquat was applied on June 21, 1979, when the lentils were 5 inches tall and had approximately 9 nodes. The air temperature on June 11 and 21 was 70 F and 64 F, respectively. The sky was clear on both occasions and there was no wind. The soil type at the study location was a Palouse silt loam with a pH of 6.5 and 3.5% organic matter. The plots were arranged in a randomized complete block design with 3 replications. Plot size was 5 ft by 9 ft. Visual evaluations were made on July 13, 1979 to determine stand and vigor reduction of the crop. No yield data were taken because of the subsequent heavy infestation of broadleaf weeds which influenced the crop vigor later in the growing season. Lentil cultivars included in the study were Red Chief, Teko, Chilian, and Laird.

Red Chief appears to have good tolerance to all herbicides at all rates included in the study. Difenzoquat at 1.5 lb/A resulted in a significant reduction in vigor of both Teko and Laird but had no influence on the crop stand. The vigor of the variety Chilian was significantly reduced by both rates of difezoquat. Although the herbicides tested did not adversely affect the lentil stands, measurable vigor reduction of 3 varieties resulted from applications of difenzoquat. Barban, diclofop methyl, HOE-23408 plus, and metribuzin at all rates had no measurable influence on the 4 lentil varieties. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Influence of postemergence herbicides on stand reduction and vigor reduction of four lentil varieties

Moscow, Idaho 1979

Treatment	Rate lb/A	Red Chief Crop SR[1]	Red Chief Crop VR[2]	TEKO Crop SR	TEKO Crop VR	Chilian Crop SR	Chilian Crop VR	Laird Crop SR	Laird Crop VR
check	0	0a	5a	0a	3ab	0a	3ab	0a	3b
difenzoquat	.75	0a	0a	0a	2b	0a	9a	0a	5b
difenzoquat	1.5	0a	5a	0a	8a	0a	9a	0a	13a
barban	1.0	0a	7a	0a	2b	0a	2b	0a	4b
barban	2.0	0a	0a	0a	0b	0a	4b	0a	0b
diclofop-methyl	.75	0a	0a	0a	2b	0a	2b	0a	2b
diclofop-methyl	1.5	0a	5a	0a	0b	0a	0b	0a	0b
HOE 23408 plus	.75	0a	0a	0a	0b	0a	3ab	0a	5b
metribuzin	.125	2a	3a	0a	2b	0a	2b	0a	3b
metribuzin	.25	0a	2a	0a	2b	0a	2b	0a	5b
metribuzin	.375	2a	5a	0a	2b	0a	0b	0a	0b
metribuzin	.5	2a	5a	0a	2b	0a	3b	0a	3b

[1] % Crop Stand Reduction

[2] % Crop Vigor Reduction

Means within a column followed by the same letter are not significantly different at the .05 level.

Effect of registered and candidate herbicides on wild oat control in lentils. Lee, G. A., T. M. Cheney and J. V. Handly. Various registered and candidate herbicides were applied preemergence surface and post emergence to determine the control of wild oats in lentils (cultivar Common). Plots were established at Joel, Idaho May 15, 1979. The sky was clear at the time of application of preemergence treatments. Air temperature and relative humidity were 55 F and 80%, respectively. Herbicides were applied May 25, 1979 when the lentils were in the crook stage of growth. Air temperature and relative humidity were 70 F and 64%, respectively. Post emergence herbicides were applied June 15, 1979 when the lentils had nine nodes. The sky was clear with an air temperature and relative humidity of 59 F and 63%, respectively. Post emergence herbicides were also applied June 25, 1979 when the lentils had eleven nodes. The sky was clear with an air temperature and relative humidity of 69 F and 62%, respectively. Herbicides were applied with a knapsack sprayer calibrated to deliver 40 gpa at 40 psi. The sprayer was equipped with a three nozzle boom. Soil type was a Palouse silt loam. Treatments were replicated three times in a randomized complete block design. Visual evaluations were taken periodically throughout the summer. Yield data was obtained by hand harvesting an area of 81 sq. ft.

Diclofop-methyl applied at .75 lb/A when the wild oats were in the 2- to 3 leaf stage gave the best stand reduction of wild oats. SD-45328 applied at .1 lb/A when the wild oats were in the 6-8 leaf stage resulted in the poorest control of wild oats. Barban at 2.0 lb/A gave adequate control when the wild oats were in the 1 to 2 leaf stage. Diclofop-methyl at .75 lb/A resulted in an excellent increase in yield over the check while SD-45328 did not reduce the yield significantly. Barban at 2.0 lb/A also showed a good increase in yield. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843.)

Effect of registered and candidate herbicides
on wild oat control in lentils

Treatment	Wild oat leaf stage	Rate lb/A	Crop SR[1]	Crop VR[2]	Wild oats SR	Wild oats VR	Yield kg/ha	Yield lb/A	% yield by wt. of check
check	-	0	0a	0c	0f	0h	966ef	863ef	100
SD-45328	6-8	.1	0a	0c	7ef	17fgh	1313b-c	1173b-c	136
SD-45328	6-8	.2	0a	0c	7ef	13fgh	1052e-f	940ef	108
SD-45328	6-8	.4	2a	5bc	53a-c	43cd	539fg	481fg	56
diclofop-methyl	2-3	.75	2a	0c	65a-c	22d-h	1640a-c	1464a-c	170
diclofop-methyl	2-3	1.0	0a	0c	82a	13f-h	1132c-e	1011c-e	117
diclofop-methyl	2-3	2.0	0a	0c	88a	27a-f	1520a-d	1357a-d	157
diclofop-methyl	4 tiller	1.0	2a	5bc	58a-c	58bc	1122c-e	1002c-e	116
diclofop-methyl	4 tiller	2.0	3a	8bc	13d-f	63b	1039d-f	928d-e	107
difenzoquat	3-5	.5	0a	2c	63a-c	25d-g	1288b-e	1150b-e	133
difenzoquat	3-5	.75	2a	12a	32c-f	67b	1126c-e	1006c-e	116
difenzoquat	4 tiller	1.0	2a	3c	57a-c	37dc	1003e-f	896e-f	104
difenzoquat	4 tiller	2.0	3a	5bc	72ab	23d-g	1244b-e	1111b-e	128
oxyfluorfen	PES	.25	0a	0c	12d-f	7f-h	1867a	1667a	193
oxyfluorfen	PES	.38	0a	0c	32c-e	10f-h	1684ab	1504ab	174
oxyfluorfen	PES	.5	0a	0c	43b-d	12e-h	1333b-e	1190b-e	138
barban	1-2	1.0	0a	0c	80a	23d-g	1856a	1657a	192
barban	1-2	2.0	0a	0c	83a	8f-h	1904a	1700a	196
propham	1-2	3qt.	0a	0c	35c-e	10f-h	1125c-e	1005c-e	116
propham	1-2	4qt.	0a	0c	3ef	0h	1240b-e	1107b-e	128
weed free		0	0a	0c	100a	100a			

[1]SR = stand reduction
[2]VR = vigor reduction
Means within a column followed by the same letter are not significantly different at the .05 level by Duncan's new multiple range test.

Broadleaf weed control in lentils. Cheney, T. M., G. A. Lee, J. V. Handly. This study was established at Moscow, Idaho to evaluate the effectiveness of herbicides for control of broadleaf weeds in lentils. The study was established May 24, 1979. Preplant incorporated herbicides were applied at this date. The sky was partly clouded with an air temperature and relative humidity of 62 F and 47%, respectively. Soil temperature at 4 and 6 inches was 70 and 57 F, respectively. Postemergence herbicides were applied June 15, 1979 when the lentils were 2 inches tall. The sky was clear with air temperature and relative humidity of 64 F and 70%, respectively. Soil temperature at 4 inches was 80 F. Soil type was a Palouse silt loam. Incorporation of preplant herbicides was accomplished with a flex-tine harrow travelling at 6 mph, twice over the field. Plot size was 9 by 30 ft. Treatments were replicated three times in a randomized complete block design. Visual evaluations of stand and vigor reduction of both crop and weeds were taken. Harvest data were obtained using a Hege small plot combine, harvesting an area of 114.75 sq. ft.

The best control of broadleaf weeds was obtained with oxyfluorfen at .5 lb/A applied preemergence surface. However, the application showed the most reduction in crop vigor and crop stand.

RH8817 at .375 lb/A applied preemergence surface also gave good control of broadleaf weeds, but resulted in significantly reduced crop vigor. RH8817 at the higher rate of .5 lb/A showed less control of broadleaf weeds and less reduction of crop vigor and stand than the same compound at .375 lb/A. Dinoseb applied postemergence at .75 lb/A gave no control of broadleaf weeds because of lack of precipitation after application.

RH8817 at .5 lb/A applied preemergence surface showed the greatest increase in yield over the check. Oxyfluorfen at .375 lb/A applied preemergence surface also increased yield over that of the check. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843.)

Table 1. Broadleaf weed control in lentils at Moscow, Idaho

Treatment	Rate lb/A	Crop SR	Crop VR	Percentage Control: Lambs-quarters control	Percentage Control: Mayweed control	Percentage Control: Redroot pigweed control	Percentage Control: Henbit control
check	--	0d	0g	0g	0c	0c	0c
oxyfluorfen (PES)	.25	8bd	18ce	62ae	85ab	100a	100a
oxyfluorfen (PES)	.375	15ab	50ab	83ad	100a	100a	100a
oxyfluorfen (PES)	.5	20a	57a	90a	100a	100a	100a
RH 8817 (PES) + triallate (PPI)	.25 + 12.5	10bd	13de	55ce	97ab	97a	100a
RH 8817 (PES) + triallate (PPI)	.375 + 1.25	13ab	17ce	60ae	100a	100a	100a
RH 8817 (PES) + triallate (PPI)	.5 + 1.25	20a	27c	87ac	98a	100a	100a
triallate (PPI)	1.25	0d	0g	0g	0c	0c	0c
RH 8817 (PES)	.25	7bd	20cd	57be	93ab	100a	100a
RH 8817 (PES)	.375	12ac	42b	88ab	100ab	100a	100a
RH 8817 (PES)	.5	10bd	10dg	45ef	80ab	100a	100a
dinoseb (Post)[1]	.5	3cd	8eg	12g	0c	3c	13bc
dinoseb (Post)	.75	3cd	10dg	53de	73ab	7c	17bc
dinoseb (Post)[2]	.75	0d	0g	2g	0c	0c	0c
dinoseb (Post)	1.5	3cd	10dg	72ae	62b	7c	27b
metribuzin (Post)	.125	3cd	0g	3g	98a	93a	90a
propham (PES)	2 qt	3cd	2fg	0g	0c	0c	0c
propham (PES)	3 qt	0d	0g	0g	0c	0c	0c
propham (PES)	4 qt	0d	0g	0g	0c	0c	0c
R 40244	.5	3cd	12df	23fg	80ab	70b	100a
R 40244	.75	7bd	20cd	70ae	90ab	93a	100a

Means with the same letter are not significantly different at the .05 level.
SR = stand reduction
VR = vigor reduction
[1] Dinoseb (ammonium salt)
[2] Dinoseb (alkanolamine salt)

Table 2. Broadleaf weed control
in lentils
at Moscow, Idaho

Treatment	Rate lb/A	Yield lb/A	% Yield[1]
oxyfluorfen (PES)	.25	987 b-c	74 b-d
oxyfluorfen (PES)	.375	1400 ab	106 ab
oxyfluorfen (PES)	.5	1393.9 ab	104 ab
RH8817 (PES) + triallate (PPI)	.25 + 1.25	1141 a-d	84 a-d
RH8817 (PES) + triallate (PPI)	.375 + 1.25	1140 a-d	86 a-d
RH8817 (PES) + triallate (PPI)	.5 + 1.25	1261 a-c	97 a-c
triallate (PPI)	1.25	1063 a-d	80 a-d
RH8817 (PES)	.25	878 b-d	64 b-d
RH8817 (PES)	.375	1258 a-c	92 a-d
RH8817 (PES)	.5	1577 a	121 a
dinoseb (Post) (ammonium salt)	.5	1197 a-d	91 a-d
dinoseb (Post) (ammonium salt)	.75	1133 a-d	87 a-d
dinoseb (Post) (alkanolamine salt)	.75	1133 a-d	83 a-d
dinoseb (Post) (alkanolamine salt)	1.5	1292 a-c	98 a-c
metribuzin (Post)	.125	675 d	51 d
propham (PES)	2 qt.	995 b-d	76 a-d
propham (PES)	3 qt.	1064 a-d	82 a-d
propham (PES)	4 qt.	742 cd	54 c-d
R40244	.5	1156 a-d	87 a-d
R40244	.75	1177 a-d	88 a-d
check	--	1381 ab	100 ab

Means followed by the same letter are not significantly different at the .05 level.

[1]% yield calculated by rep.

Winter oat tolerance to DPX 4189 and diuron. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Two field trials were established at Corvallis, Oregon to compare DPX 4189 and diuron for tolerance on 'Amity' and 'Walken' winter oats. Each trial had five replications in a randomized complete block design. Herbicides were applied preemergence, early postemergence (2 to 3 leaf), and late postemergence (2 to 6 tillers).

A colder-than-normal winter injured the oats and undoubtedly contributed to grain yield reduction in the diuron treatments. Oat grain yield was higher in the untreated control and the DPX 4189 treatments at rates of 0.07 and 0.035 kg/ha than in the diuron treatments of 1.8 kg/ha, although not all differences were statistically significant. Oat tolerance to DPX 4189 tended to decrease with later timings of the higher rates. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Winter oat grain yield
from treatments of DPX 4189 and diuron

Treatment	Rate	'Amity' oats	'Walken' oats
	(kg/ha)		
Preemergence, October 18, 1978			
diuron	1.8	3036	3192
diuron	3.6	0	180
DPX 4189	0.035	4690	3796
DPX 4189	0.07	4601	3801
Early postemergence, November 13, 1978			
diuron	1.8	1452	3348
diuron	3.6	0	0
DPX 4189	0.035	4479	3835
DPX 4189	0.07	4240	3572
DPX 4189	0.14	4016	2870
Late postemergence, March 1, 1978			
diuron	1.8	3441	2471
diuron	3.6	1530	336
DPX 4189	0.035	4547	3641
DPX 4189	0.07	3611	3236
DPX 4189	0.14	2900	3041
Untreated control	0	4128	3733
	$LSD_{.05}$	488	764
	$LSD_{.01}$	649	1016

Tolerance of five pea varieties to five herbicides. Handly, J. V., G. A. Lee, D. L. Auld, G. A. Murray and W. S. Belles. The trial was established to evaluate the tolerance of five pea varieties when treated with five postemergence herbicides. The plots were seeded at Moscow, Idaho on May 22, 1979. All herbicides except barban were applied with a knapsack sprayer equipped with a three nozzle boom and calibrated to deliver 40 gpa. Barban was applied with the same equipment calibrated to deliver 5 gpa. Barban, diclofop-methyl, metribuzin, and HOE-23408 plus were all applied on June 11, 1979 when the peas were 3 inches tall and had approximately 3 nodes. Difenzoquat was applied on June 21, 1979 when the peas were 9 inches tall and had approximately 7 nodes. The air temperature was 70 F and 64 F, respectively. The sky was clear on both occasions and there was no wind. The soil was a Palouse silt loam. The study was arranged in a randomized complete block design with 3 replications. Plot size was 5 ft. by 9 ft. Visual evaluations were made on July 13, 1979 to determine stand and vigor reduction of the crop. No yield data was taken. Cultivars used were Fenn, Melrose, Latah, Garfield and Tracer.

Fenn, Melrose, Garfield and Tracer were most adverse influenced by difenzoquat at 1.5 lb/A. Latah appeared to be the most sensitive of the cultivars experiencing a stand reduction of 10% or greater with difenzoquat at 1.5 lb/A, barban at 2 lb/A, HOE 23408 plus at .75 lb/A and metribuzin at .25 lb/A. Some plots in the study were also subjected to inadequate weed control which contributed to stand and vigor reduction. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843.)

Tolerance of five pea varieties to five herbicides at Moscow, Idaho

Treatment	lb/A	Fenn		Melrose		Latah		Garfield		Tracer	
		SR[1]	VR[2]	SR	VR	SR	VR	SR	VR	SR	VR
check	0	0a	0c	0a	7	2ab	0	0b	7b	0c	3b
difenzoquat	.75	2a	7b	3a	8	8ab	7ab	0b	ab	5ab	10b
difenzoquat	1.5	0a	13c	5a	12	10ab	12a	7a	23a	8a	22a
barban	1.0	0a	2c	0a	5	5ab	2b	3ab	5b	2bc	5b
barban	2.0	2a	2c	5a	5	12ab	3b	3ab	5b	3bc	3b
diclofop-methyl	.75	0a	2c	0a	2	0b	2b	0b	0b	0c	2b
diclofop-methyl	1.5	2a	0c	0a	2	3ab	0b	2ab	3b	0c	3b
HOE 23408 plus	.75	0a	3bc	0a	8	13a	5ab	0b	0b	3bc	2b
metribuzin	.125	2a	5bc	0a	5	2ab	2b	0b	0b	2bc	3b
metribuzin	.25	0a	2c	0a	7	10ab	5ab	0b	0b	2bc	2b
metribuzin	.375	0a	0c	0a	0	3ab	0b	0b	0b	0c	0b
metribuzin	.5	0a	0c	0a	3	7ab	2b	3ab	3b	3bc	3b

Means within a column followed by the same letter are not significantly different at the .05 level.

[1] % crop stand reduction

[2] % crop vigor reduction

Desiccation of peas with dinoseb. Handly, J. V., G. A. Lee, and G. Cockrum. This study was initiated at Moscow, Idaho, on July 24, 1979 to evaluate the effectiveness of dinoseb as a desiccation agent to facilitate ripening of dry edible peas. (Cultivar Alaska). All treatments were applied on July 24, 1979 with a knapsack sprayer equipped with a 3 nozzle boom and calibrated to deliver 40 gpa. Air temperature was 71 F and the sky was clear. Relative humidity was 72%. The soil temperature was 62 F and 65 F at 4 inches and 6 inches, respectively. The study was arranged in a randomized complete block design with 3 replications and a plot size of 9 by 30 ft. Foliage and peas were harvested 3, 7, 10, and 14 days after application of chemicals with a Hege plot combine. At each sampling time, foliage, seed, and mayweed were weighed and placed in a forced air dryer at 100 F for 3 days. The percent change in moisture was then determined.

Seed in plots treated with dinoseb at 3 and 6 qt/A and harvested 3 days after application contained significantly less moisture than the check plots or the plots treated with dinoseb at 2 qt/A. This trend continues into the 7 day harvest but by 10 and 14 days any significant differences are lost. This loss of differences may be due to the hot dry weather that followed application of the treatments and aided natural ripening. In a wet year we might expect the moisture level in the check to remain much higher than in plots treated with dinoseb throughout the study period. While significant differences were not found for most moisture levels in the pea foliage or the mayweed, field conditions showed that harvest in treated plots was aided by dinoseb applications. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Induced ripening of peas with dinoseb at
Moscow, Idaho, 1979

Treatment	Rate Qts/A	% Moisture change in Seeds at Harvest[1] (days)				% Moisture change in foliage at Harvest (days)				% Moisture change in Mayweed at Harvest (days)			
		3	7	10	14	3	7	10	14	3	7	10	14
check	-	37a	27ab	13de	0e	57a	49ab	-	0d	-	74a	63ab	60ab
dinoseb + morac	2+2	25b	23bc	10de	0e	42ab	40a-c	-	13cd	-	62ab	72ab	72ab
dinoseb + morac	3+2	17cd	14cd	10de	0e	35a-c	40a-c	-	0d	-	63ab	69ab	61ab
dinoseb + morac	6+2	14cd	9de	12cd	0e	30a-c	28bc	-	13cd	-	59ab	70ab	48b

[1] Harvest dates are from time chemicals were applied. Peas contained approximately 68% moisture at time chemicals were applied July 24, 1979.

Means within a column followed by the same letter are not significantly different at the .05 level.

Wild oat control in peas. Handly, J. V., G. A. Lee, D. L. Auld and G. A. Murray. This trial was established to evaluate the performance of four herbicides for wild oat control in peas. The study was initiated on May 25, 1979 at Moscow, Idaho. All herbicides were applied with a knapsack sprayer fitted with a three nozzle boom and calibrated to deliver 40 gpa. Preplant treatments were applied when the air temperature was 65 F under partially cloudy skies. Climatic conditions prevailing at the time of preemergence applications were air temperature at 68 F and clear skies. On both occasions wind speed was approximately 3 mph. Preplant applications were incorporated 2 to 3 inches with a disc traveling 3 mph, twice over the area at right angles. The pea cultivar used was Alaska. The study was arranged in a randomized complete block design with three replications. Plot size was 9 ft. by 30 ft. Visual evaluations were taken to determine stand and vigor reduction of both crop and wild oats. The plots were harvested with a Hege plot combine.

Complementary preplant treatments of triallate at 1.25 lb ai/A with preemergence applications of oxyfluorfen at .25 lb ai/A, RH8817 at .25 and .38 lb ai/A and R-40244 at .5 lb ai/A, resulted in 82% or better control of wild oat.

Oxyfluorfen and triallate alone, however, provided only marginal control. Best yields were obtained from plots treated with triallate and oxyfluorfen or R-40244. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Crop tolerance and wild oat control in peas with three herbicides, Moscow, Idaho

Treatment	Rate lb/A	Crop SR[1]	Crop VR[2]	Wild oat SR	Wild oat VR	Yield lb/A	% yield by weight of check
check	-	0.0b	0.0b	0.0e	0.0b	633ab	100
triallate (PPI) + oxyfluorfen (PES)	1.25 + .25	1.0ab	4.0ab	82.3a-c	0.0b	775a	122
oxyfluorfen (PES)	.25	0.0a	1.6b	52.6cd	1.6ab	527ab	83
oxyfluorfen (PES)	.38	0.0a	6.6a	38.3d	0.0b	554ab	87
oxyfluorfen (PES)	.5	1.6ab	1.6b	48.3cd	1.6ab	547ab	88
RH8817 (PES) + triallate (PPI)	.25 + 1.25	1.6ab	2.3ab	94.0a	0.0b	494b	78
RH8817 (PES) + triallate (PPI)	.38 + 1.25	3.3a	6.6a	93.3a	5.0a	521ab	83
RH8817 (PES) + triallate (PPI)	.5 + 1.25	0.0b	3.3ab	75.6a-c	0.0b	604ab	97
triallate (PPI)	1.25	1.6ab	1.6b	66.0a-d	0.0b	544ab	86
R40244 (PES) + triallate (PPI)	.5 + 1.25	0.0b	1.6b	86.6ab	1.6ab	649ab	104

[1]SR = stand reduction
[2]VR = vigor reduction
Means followed by the same letter are not significantly different at the .05 level.

Evaluation of seven herbicides in winter peas. Handly, J. V., G. A. Lee, D. L. Auld, and G. A. Murray. This study was established at Nez Perce, Idaho to evaluate the performance of 7 herbicides in winter peas (Cultivar Melrose). All herbicides were applied with a knapsack sprayer fitted with a 3 nozzle boom and calibrated to deliver 40 gpa. Pre-plant treatments were applied on October 6, 1978 under clear skies at 72 F. Relative humidity was 35%, soil temperature at 6 inches was 65 F and the surface was covered by a heavy straw residue. Incorporation was accomplished with a Howard Roto-tiller set to a depth of approximately 2 inches. The crop was seeded on October 6 after the pre-plant treatments had been applied. Preemergence treatments were applied on October 12, 1979 under clear skies with a relative humidity of 34%. Air and soil temperature at 4 inches were 53 F and 65 F, respectively. Postemergence treatments were applied on April 6, 1979 when the peas were approximately 2 inches tall. The sky was overcast and the air temperature was 48 F. Soil moisture was high and the temperature at 4 inches was 45 F. At the time a slight breeze of 2 to 3 mph was present. The study was arranged in a randomized complete block design with 4 replications. Plot size was 6 ft by 24 ft. Visual evaluations were taken on June 6, 1979 to determine stand and vigor reduction on both crop and weeds. Plots were harvested with a Hege plot combine.

Plots treated with propham at 3 and 4 lb ai/A resulted in stand reductions of 5 and 8 percent, respectively, both of which were significantly different from the check. (See accompanying tables). Vigor reductions of 5 and 8 percent resulted from plots treated with propham at 3 and 4 lb ai/A, respectively. No other treatment produced significantly different vigor or stand reductions when compared to the check. Dinoseb at 2 and 3 gal/A gave good control of all weed species evaluated in this study as did R-40244 at .5 lb ai/A. Propham gave inadequate control of all species except mayweed and downy brome of which satisfactory control was obtained. Dinitramine alone and in conjunction with diclofop-methyl gave good grass control, but were weak on the weedy mustards. Satisfactory control of downy brome was obtained with all herbicides tested in this study. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Table 1
Crop tolerance and weed control with six herbicides
in winter peas
Nezperce, Idaho, 1979

Treatment	Rate	Crop SR[1]	Crop VR[2]	Percent control: Field pennycress SR	Percent control: Henbit SR	Percent control: Shepherdspurse SR
Check	--	0b	0b	0c	0c	0b
dinoseb (PES)	2.0 gal	0b	0b	94a	66b	99a
dinoseb (PES)	3.0 gal	0b	0b	100a	59b	100a
R-40244 (PES)	.5 lb	0b	0b	100a	100a	100a
trifluralin (PPI)	.75 lb	0b	0b	0c	99a	0b
dinitramine & diclofop-methyl (PPI)	.5 + 1.0 lb	0b	0b	0c	98a	0b
dinitramine	.5 lb	4ab	0b	0c	85a	0b
trifluralin & diclofop-methyl (PPI)	.5 + 1.0 lb	4ab	6a	0c	85a	0b
propham (Post)	3.0 qt	5a	5ab	5c	0c	0b
propham (Post)	4.0 qt	8a	8a	8c	0c	0b
dinoseb/propham	2.0 gal + 3 qt	0b	3ab	60b	0c	98a

Means followed by the same letter are not significant at the .05 level

[1] SR = Stand Reduction

[2] VR = Vigor Reduction

Table 1 continued
Crop tolerance and weed control with six herbicides
in winter peas
Nezperce, Idaho, 1979

Treatment	Rate	Chickweed SR	Miners Lettuce SR	Downy Brome SR	Windgrass SR	Mayweed SR	Yield lb/A	% yield by wt. or check
check	–	0c	0e	0b	0c	0c	1257cd	100b
dinoseb(PES)	2.0 gal	65a	96ab	99a	81ab	65b	1768a-c	214ab
dinoseb(PES)	3.0 gal	58ab	100a	88a	93a	95a	1804a-c	186ab
R-40244(PES)	.5 lb	76a	99ab	90a	93a	75b	2149ab	264ab
trifluralin(PPI)	.75 lb	43ac	50b-d	86a	76ab	10c	818d	97b
dinitramine & diclofop-methyl(PPI)	.5+ 1.0 lb	66a	98ab	99a	94a	0c	1417b-d	122ab
dinitramine	.5 lb	54ab	84a-c	99a	83ab	0c	1490b-d	168ab
trifluralin & diclofop-methyl(PPI)	.5 + 1.0 lb	19bc	48cd	99a	84ab	0c	1358b-d	114b
propham (Post)	3.0 qt	45ab	25de	99a	0c	100a	1772a-c	174ab
propham (Post)	4.0 qt	51ab	0e	100a	0c	98a	1580b-d	181ab
dinoseb/propham	2.0 gal + 3 qt	18bc	60a-d	100a	71a	99a	2485a	291a

Means followed by the same letter are not significant at the .05 level.

[1] SR=Stand reduction

[2] VR=Vigor reduction

Peppermint tolerance to oxyfluorfen. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. Oxyfluorfen was evaluted in western and central Oregon for tolerance on peppermint. Experiments were randomized complete block designs with 2.5 by 8 m plots.

Applications of oxyfluorfen were made on March 22, 1979 in central Oregon and on October 10, 1978 and January 29, 1979 in western Oregon. On March 22, 1% of the peppermint had emerged. In western Oregon, peppermint was 1 to 3 cm tall on October 10 and was considered dormant on January 29. Herbicide rates were 0.56, 1.12, and 2.24 kg/ha.

In central Oregon, injury ratings ranged from 2 to 41% with increasing rates when evaluated in May but no differences in oil yield were obtained.

Visual evaluations of the western Oregon trial in June produced injury ratings of 32 to 46% for the October applications and 8 to 28% for the January applications. The two lower rates of oxyfluorfen applied in January were the only western Oregon treatments that did not significantly reduce peppermint oil yield. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Peppermint tolerance and groundsel control with DPX 4432 and DPX 4189. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. A non-replicated field trial was established at Lebanon, Oregon to determine the tolerance of two experimental herbicides on peppermint. Plots were 2 by 6 m. Treatments were made on dormant peppermint on December 5, 1978 and the final visual evaluation was made on June 10, 1979.

No peppermint injury was observed in DPX 4432 treatments at rates of 0.28, 0.42, or 0.56 kg/ha. Common groundsel control was 90% with the low rate and 100% with the two higher rates.

All rates of DPX 4189 killed the peppermint (0.035, 0.07, and 0.14 kg/ha). Only the highest rate of DPX 4189 produced any visible control of common groundsel in June, and that was 20%.

Paraquat plus terbacil and paraquat plus diuron did not cause visible injury to peppermint or reduce common groundsel competition when observed in June. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Potato herbicide weed control and crop yield evaluation trials. Brenchley, R. G. Herbicide evaluation trials were established at the Southwestern Idaho Research and Extension Center near Parma, Idaho, to evaluate potential herbicides for weed control in Russet Burbank potatoes. Herbicide applications were made on May 3, 1979 (preemergence incorporated), May 31, 1979 (post emergence). Environmental conditions at time of application were as follows: (May 3, 1979, air temperature 75 F, soil temperature 56 F, relative humidity 12%, wind E 3 mph, cloud cover clear, soil surface dry to three inches), (May 31, 1979, air temperature 71 F, soil temperature 60 F, relative humidity 8%, wind NW 2 mph, cloud cover clear, soil surface dry to five inches). Soil type was a silt loam, pH 7.2, CEC 15 meq with 1.2% organic matter. Plot size was 7 by 40 feet. Treatments were replicated four times in a randomized complete block design. Herbicide applications were made using a CO_2 propelled knapsack sprayer equipped with a four nozzle (8004) boom utilizing 30 psi pressure which delivered 32 gpa total volume. Preemergence incorporated treatments were applied after seeding and incorporated to a three inch depth using a power roto-tiller. Crop was planted on May 2, 1979, and harvested on October 11, 1979.

Rainfall amount consisted of .82 inches on May 6 to 9, 1979, .24 inches on June 18, 1979, 1.65 inches on August 14, 1979. Plots were furrow irrigated on May 30, 1979, July 2, 1979, July 18, 1979, July 28, 1979, August 4, 1979, and September 7, 1979.

Weed species and density per square foot, (average of six sq. ft. per plot) six inches on either side of the potato row were redroot pigweed 27.6, common lambsquarter 7.3, hairy nightshade 5.6, barnyardgrass 3.5, and kochia 0.7. Weed control counts were taken June 6, 1979.

Those treatments giving 85% or greater control of all weed species encountered in this trial plus a minimum of 400 cwt/A potato yields are listed as follows in their order of performance: EPTC + dinitramine, alachlor + trifluralin, metolachlor + metribuzin, alachlor + metribuzin and dinitramine. Kochia and hairy nightshade are two weed species in western Idaho which are most likely to present problems to potato growers since both species often escape standard herbicide treatments. Kochia is a highly competitive weed. Trifluralin combinations, dinitramine and metribuzin showed promise for controlling kochia while cycloate and dinitramine to a lesser extent showed promise for controlling hairy nightshade. (University of Idaho, SW Idaho Research and Extension Center, Parma, ID 83660)

Potato herbicide weed control and crop yield evaluations in 1979 at Parma, Idaho

Treatment[1]	Rate lb/A	Percent Weed Control[2] PW	KO	LQ	HNS	BYG	Yield cwt/A
Vernolate	3.0	91	33	93	45	99	312.9
Vernolate	4.0	92	55	100	87	100	336.9
Vernolate	6.0	99	58	99	89	100	371.2
Cycloate	3.0	80	25	88	96	97	254.6
Cycloate	4.0	87	48	93	96	100	287.5
Cycloate	6.0	96	57	93	99	100	293.0
EPTC	3.0	75	59	70	79	100	272.9
EPTC + Trifluralin	2.0+0.5	95	87	96	66	100	409.1
EPTC + Dinitramine	2.0+0.38	98	100	96	100	100	479.8
Trifluralin	0.5	96	67	99	55	99	363.7
Dinitramine	0.38	97	89	98	86	99	404.5
Alachlor	3.0	100	70	91	77	100	366.3
Alachlor + Metribuzin	3.0+0.5	98	100	98	95	100	411.6
Alachlor + Trifluralin	2.5+0.5	99	100	95	98	100	447.1
Metolachlor	2.5	97	69	85	75	100	342.3
Metolachlor + Metribuzin	2.0+0.5	98	100	100	95	100	440.9
Metribuzin	0.5	100	100	100	51	84	413.3
Metribuzin (post)	0.5	98	88	100	41	82	348.6
Metribuzin + Diclofop (post)	0.5+1.5	96	100	99	56	87	417.1
Handweeded Check		100	100	100	100	100	455.1
Weedy Check		0	0	0	0	0	124.9

[1] All treatment were applied preemergence incorporated except those indicated post emergence.

[2] PW = redroot pigweed, KO = kochia, LQ = common lambsquarters, HNS = hairy nightshade
BYG = barnyardgrass

Effect of preplant herbicides on broadleaf weed control in winter rape. Cheney, T. M., W. J. Schumacher, G. A. Lee, G. A. Murray and D. L. Auld. A study was established at Moscow, Idaho to determine the effect of various herbicides on broadleaf weed species in winter rape. Plots were sprayed July 31, 1978. Individual plots measured 9 by 25 ft. Herbicides were applied preplant and incorporated to a depth of 2 inches with a disc and harrow traveling at 4 mph crossing the field at right angles. Herbicides were applied with a knapsack sprayer equipped with a three nozzle boom, calibrated to deliver 40 gpa at 40 psi. Treatments were replicated three times in a randomized complete block design. Soil temperatures at 4 and 6 inches were 80 F and 88 F, respectively. The sky was clear with an air temperature and relative humidity of 75 F and 60%, respectively. Trash cover was minimal with a clod size of 2". Evaluations of crop vigor and stand reduction and broadleaf weed vigor and stand reduction were collected twice that summer and fall. Harvest data was obtained using a chain combine harvesting an area of 92.25 sq. ft.

Trifluralin + diallate at .5 + 1.25 lb/A gave the best total average weed control without substantially reducing crop stand. Crop vigor was slightly affected. All herbicides except propham gave excellent control of blue scorpion grass and henbit. Dinitramine at .375 lb/A gave poor control of all species except those previously mentioned. Trifluralin at .75 lb/A reduced the yield the least of all herbicides used. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843.)

Table 1. Winter rape screening trial - plant science farm

Treatment	Rate lb/A	Yield lb/A	% yield by wt. of check
check	-0-	4185a	100a
trifluralin	.75	3888ab	95ab
dinitramine	.375	3370bc	83a-c
dinitramine	.66	3122c	78b-d
profluralin	1.0	3094c	77cd
pendimethalin	1.0	3420bc	85a-c
ethalfluralin	.5	3021c	65d
ethalfluralin	.75	3410bc	85a-c
benefin	1.5	3356bc	84a-c
propham	2.0	3369bc	85a-c
trifluralin + diallate	.5+1.25	3512bc	86a-c
trifluralin + cycloate	.5+2.0	3350bc	83a-c

Means followed by the same letter are not significantly different at the .05 level.

Table 2. Broadleaf weed control in winter rape at Moscow, Idaho

Treatment	Rate lb/A	Crop SR	Crop VR	Percentage Control: Tumble Mustard	Shepherds purse	Prickly lettuce	Pineapple weed	Spring Whittle-wort	Blue scorpion grass	Henbit
check	-0-	0	0	-	-	-	-	-	-	-
trifluralin	.75	2.5	0	0	0	71.7	0	100	100	95
dinitramine	.375	2.5	5	0	38.8	52.5	61.3	56.7	100	100
dinitramine	.66	15	6.3	10	26.3	37.5	25	82.5	100	95
profluralin	1.0	12.5	11.3	0	10	23.3	85	71.3	100	92.5
pendimethalin	1.0	7.5	11.3	0	0	7.5	16.7	75	100	97.5
ethalfluralin	.5	27.5	21.3	0	0	0	52.5	97.5	100	100
ethalfluralin	.75	22.5	8.8	0	0	0	56.7	95	100	100
benefin	1.5	17.5	15	0	0	0	37.5	12.5	100	95
propham	2.0	20	8.8	0	0	0	0	0	0	0
trifluralin + diallate	.5 + 1.25	5	12.3	92.5	87.5	35	86.3	97.5	100	100
trifluralin + cycloate	.5 + 2.0	17.5	13.8	85	43.8	86.7	95	23.8	95	95

SR = stand reduction. VR = vigor reduction.

Evaluation of preplant incorporated herbicide treatments for broad spectrum weed control in winter rape. Schumacher, W. J., G. A. Lee, D. L. Auld, G. A. Murray. This study was initiated on August 10, 1978 in Nezperce, Idaho to evaluate preplant incorporated treatments for broad spectrum weed control in winter rape (cultivar Dwarf Essex). All treatments were applied with a conventional knapsack sprayer equipped with a 3 nozzle boom and calibrated to deliver 40 gap. Air and soil temperature at time of application was 87 F and 80 F at 6 inches, respectively. Soil surface was dry on the top 3 inches. A disc followed by a spike tooth harrow was used to incorporate the herbicides to a depth of 2 inches. The incorporation equipment was pulled over the test plots twice at right angles at a speed of 6 mph. Plot size was 9 ft. by 25 ft. with 3 replications and arranged in a randomized complete block design. Crop stand and vigor reduction along with weed stand and vigor reduction were taken visually. Yield data was obtained using a Hege small plot combine, harvesting an area of 81 sq. ft.

Plots treated with trifluralin at .75 lb ai/A resulted in the best broad spectrum weed control, but the treatment was weak on tansy mustard and shepherdspurse. Cycloate and propham + extender resulted in the lowest control of all weed species.

Although no significant difference was obtained in yields, cycloate and profluralin resulted in the highest yields of 4345 lb. or better. All treatments yielded higher than the check with the exception of trifluralin, dinitroamine, and benfluralin. It appeared that although trifluralin gave the best weed control, the safety factor for crop tolerance was lower resulting in the lowest yield of 3636 lb/A. (Idaho Agriculture Experiment Station, Moscow, Idaho, 83843.)

Herbicide screening trial for broad spectrum weed control in winter rape at Nezperce, Idaho

			% Control							
Treatment	Rate lb/A	Percent crop stand reduction	Tansy mustard	Shepherds-purse	Bedstraw	Henbit	Field penny-cress	Mayweed	lb/A	% yield by weight of check
check	0	0a[1]	0a	0b	0c	0b	0d	0b	4145a	100
trifluralin	.75	0a	33a	0b	100a	100a	90ab	82a	3636a	88
dinitroamine	.5	0a	0a	33ab	100a	87a	10d	80a	4245a	104
dinitroamine	.66	0a	0a	10ab	0c	100a	33d	97a	3780a	95
ethalfluralin	.5	0a	47a	20ab	87a	100a	80bc	92a	4266a	105
ethalfluralin	1.0	0a	5a	63a	100a	100a	80ab	93a	4195a	104
profluralin	1.0	3	23a	30ab	80ab	100a	20d	50ab	4341a	108
pendimethalin	1.0	0a	0a	0b	100a	100a	0d	67a	4111a	102
trifluralin + diallate	.5+1.25	0a	25a	33ab	100a	100a	43bcd	87a	4286a	107
benfluralin	1.5	0a	17a	0b	60ab	100a	0d	100a	3732a	93
cycloate	2.0	3a	0a	0b	0c	33b	0d	33ab	4345a	108
propham + extender	2.0	7a	20a	0b	33bc	33b	0d	33ab	4204a	104

1 Means followed by the same letter(s) in the same column are not significantly different at the .05 level.

Postemergence herbicides for selective wild oat control in winter rape. Schumacher, W. J., G. A. Lee, W. S. Belles and J. V. Handly. The investigation was established at Nezperce, Idaho, to evaluate the effect of postemergence herbicides for wild oat control in winter rape (cultivar Dwarf Essex). Herbicide treatments were applied on November 2 and 24, 1978 when wild oat plants were in the 1- to 3-leaf stage and 3- to 5-leaf stage of growth, respectively. Treatments were also applied on April 10, 1979 as early postemergence treatments when the wild oats were in the 1-leaf stage of growth. A conventional knapsack sprayer equipped with a 3 nozzle boom calibrated to deliver 5 or 20 gpa was used. Air and soil temperature at 6 inches on November 2 and 24, and April 10 were 61 F and 55 F, 74 F and 56 F, and 38 F and 40 F, respectively. Soil moisture was high at all three dates. Wild oat population density on November 2 was 89 plants/sq. ft. On April 10, it snowed lightly after herbicide application. Crop stand and vigor reduction along with wild oat stand and vigor reduction were taken visually. Yield data were obtained using a Hege small plot combine. Area harvested was 93.5 sq. ft.

Plots treated with difenzoquat at .75 and 1.0 lb/A greatly reduced stand and vigor of the crop and had little effect on wild oat control. Diclofop-methyl at 1.0 lb/A gave 82% control of wild oats with no resultant crop injury. Propham applied in the spring resulted in higher wild oat control and had a higher incidence of crop susceptibility than did the fall application of propham. The diclofop-methyl treated plots had the highest yields compared to the other herbicide treatments. All treatments yielded higher than the check with the exception of difenzoquat at .75 and 1.0 lb/A and propham at 3.0 lb ai/A at both the fall and spring treatment dates. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Effect of selective postemergence herbicides for wild oat control in winter rape at Nezperce, Idaho

Treatment	Rate	Crop SR[1]	Crop VR[2]	Wild Oat SR	Wild Oat VR	lb/A	% yield by weight of check
Check	0	0f	0e	0d	0d	3077c-e	100
barban (1-3)[3]/barban (3-5)	.25/.25	7f	10e	28b-d	22b-d	2997de	115
barban (1-3)	.5	7f	7e	30b-d	20b-d	3802a-d	156
barban (3-5)	.5	12ef	13ed	28b-d	22b-d	3286c-e	125
diclofop-methyl (1-3)	.75	2f	3e	77a	53a-c	4163a-c	166
diclofop-methyl (1-3)	1.0	0f	5e	82a	62a	4485a	148
hoe-23408 plus (1-3)	.63	0f	3e	62a-c	55a	4386a-c	149
hoe-23408 plus (1-3)	.75	0f	2e	63a-c	50a-c	4413ab	149
difenzoquat (3-5)	.75	83a	53ab	3d	3d	923f	33
difenzoquat (3-5)	1.0	83a	62a	5d	3d	743f	27
propham (3-5)	3.0	38cd	30cd	18cd	18b-d	2742de	98
propham (3-5)	4.0	28de	17de	28b-d	13cd	3671a-e	139
propham (spring)	3.0	52bc	40bc	65a-c	27a-d	2639e	95
propham (spring)	4.0	35cd	37c	73ab	18b-d	3376a-d	134

[1] SR = stand reduction
[2] VR = vigor reduction
[3] Numbers in brackets relate to wild oat application stage.

Means followed by the same letter are not significant at the .05 level.

Preplant herbicide combinations for annual weed control in sugarbeets. J. O. Evans and F. Francom. Frequently a single herbicide used as a preplant incorporated treatment fails to control the broad spectrum of annual broadleaved and grassy weeds which are common in any production area. The purpose of this test was to determine the compatibility and efficacy of mixtures of preplant herbicides to control a broader range of species. A field in Box Elder County, Utah was prepared for sugarbeet planting and sprayed on April 21, 1978. Herbicides were incorporated immediately after application using a flex-tine harrow twice over the field set to stir the soil two and one-half inches. Sugarbeets were planted on the same day.

Evaluations and counts were made May 19 and compared to the untreated controls. Numerous combinational treatments controlled all species present and were more effective than single herbicides when all species were considered. Combinations of herbicides were not more injurious to sugarbeets than single herbicides. Cycloate, ethofumesate and diethatyl are especially promising for combination treatments. (Utah Agricultural Experiment Station, Logan, Utah 84322).

An evaluation of several preplant herbicides for annual weed control in sugarbeets

Treatment	Rate (lb ai/A)	Sugarbeet response #/100 inches of row	Weed response (% control) Redroot pigweed	Lambs-quarters	Night-shade	Shepherds-purse
cycloate	2.0	17	68	98	99	96
cycloate	2.5	18	100	99	98	97
ethofumesate	1.5	17	100	90	90	88
ethofumesate	2.0	14	100	98	77	96
ethofumesate	2.5	17	100	99	94	96
ethofumesate	3.0	12	100	99	96	95
diethatyl	2.5	12	100	73	95	91
diethatyl	3.5	14	100	76	94	96
diclofop	3.0	19	0	3	0	33
DRW 1139	3.0	16	68	84	85	75
Control		21	0	0	0	0

Preplant incorporated herbicide treatments for weed control in sugarbeets. Humburg, N. E. and H. P. Alley. Plots were established April 25, 1979 on loam soil (51.6% sand, 27.6% silt and 20.8% clay) of pH 8.1 with 1.4% organic matter. Herbicides were applied with 34.5 gpa water solution (band-acre basis) in 7-in bands on 22-in bedded rows. Incorporation of herbicides with a rotary incorporator was simultaneous with application. Plots were 5.5 by 50 ft with three replications in a randomized complete block design. Air temperature at the time of treatment was 55 F; soil temperatures were 77, 68, 63 and 53 ft at the surface and depths of 1, 2 and 4 in, respectively. Mono Hy D_2 seed was planted at a rate of two seeds per ft of row.

Sugarbeet stand and weed population counts were made on June 7. Sugarbeet stands were less than that of the untreated check plots for all but two treatments. No treatment provided total control of weeds. Control of wild buckwheat was poor on plots treated with cycloate and cycloate combination with other herbicides when application rates of cycloate were 3.0 lb/A or less. Ethofumesate alone or in combination provided little control of wild buckwheat at application rates less than 2.0 lb/A. The most effective treatments for controlling wild buckwheat were ethofumesate + diclofop at 3.0 + 1.0 lb/A and diethatyl + pyrazon at 2.0 + 3.0 lb/A, which gave 63 and 60% control, respectively. Most treatments provided better control of common lambsquarters than wild buckwheat. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-993).

Preplant incorporated herbicide treatments for weed control in sugarbeets

Treatment[1]	Rate lb/A	Sugarbeet stand[2] %	Percent control[2]	
			wild buckwheat	common lambsquarters
cycloate	3.0	82	0	73
cycloate	4.0	94	11	63
cycloate [+ extender]	3.0	100	0	23
cycloate [+ extender]	4.0	90	44	70
cycloate + diethatyl	2.0 + 2.0	92	0	17
cycloate + ethofumesate	1.0 + 2.0	82	16	66
cycloate + ethofumesate	1.5 + 1.5	82	12	39
diethatyl	3.0	84	0	48
diethatyl	4.0	100	9	78
diethatyl+ ethofumesate	1.5 + 1.5	82	0	72
diethatyl+ ethofumesate	2.0 + 2.0	76	19	61
diethatyl+ diclofop	2.0 + 2.0	96	17	54
diethatyl+ diclofop	2.0 + 3.0	88	60	72
ethofumesate + pyrazon	2.0 + 3.0	90	39	44
ethofumesate	2.0	86	26	14
ethofumesate	3.0	86	50	55
ethofumesate + diclofop	2.0 + 1.0	88	15	68
ethofumesate + diclofop	3.0 + 1.0	80	63	59
Check	---	100	0	0
plants/ft of row, 3-in. band		*1.3*	*1.6*	*0.8*

[1]Herbicides applied and incorporated April 25, 1979.
[2]Sugarbeet and weed counts June 7, 1979.

Preplant and sequence herbicide applications on sugarbeets, 1980. Sullivan, Edward F. and Keith A. Haagenson. Preplanting herbicides, mixtures and sequence applications were made at Longmont, CO and Gering, NE. Spray was delivered at 132 l/ha in a 17.8 cm band both preplant and postemergence. Preplant applications were incorporated at the 3.8 cm soil depth with a power tiller simultaneously with crop planting which occurred in mid to late April. Postemergence applications were made at the optimal maturity stages of weeds and beets in late May. Plot size measured 9.12 m by 6 rows at 56 cm spacing.

Soil moisture was adequate to ample for rapid crop and weed emergence at both sites. At Longmont, weed populations were reduced, especially grasses, by an early freeze; however, temperatures during establishment were within decade ranges. Weed species in the untreated controls were redroot pigweed, common lambsquarters, green and yellow foxtail and foxtail millet. Population densities ranged from 38 to 90 weeds per sq. m among trials and sites.

The seedbeds at Longmont (sandy clay loam, pH 7.9, O.M. 1.8%) and Gering (loam, pH 7.7, O.M. 2.3) were smooth and dry at the surface with a firm, wet subsoil. Great Western MONO HY D_2 sugarbeet seed was sown at four seeds per 30.5 cm of row and at 2.5 cm soil depth.

Plant counts were taken 10 days after postemergence application on the four innermost rows within a guadrat which measured 7.6 cm by 1.2 cm. Visual estimates of pre-thinning seedling beet retardation were made also.

Weed control results are reported as percentages of the untreated controls (Tables 1 and 2). Excellent broad-species weed kill was obtained from most mixtures and sequences although the complementary effect of diclofop-methyl when tank-mixed with cycloate was absent. Diethatyl-ethyl sequences were less effective on common lambsquarters than other complementary applications. Diclofop-methyl applied preplanting gave excellent foxtail control. Late weed control observations made on August 30 at Gering indicated that the ethofumesate (3.4 kg/ha) sequence had 20 percentage points more residual weed control than that obtained from the cycloate sequence. The ethofumesate + diclofop-methyl sequences gave the more effective residual weed control scores. Root weight differences were statistically non-significant; however, sequence applications were more effective than preplant applications only, especially diethatyl-ethyl at 4.5 kg/ha/ phenmedipham + desmedipham. (The Great Western Sugar Company, Agricultural Research Center, Longmont, CO 80501. Published with the approval of the Director as Abstract No. 23-H Journal Series).

Table 1. Effect of preplant herbicides on sugarbeets and weeds at Longmont, CO and Gering, NE, spring 1979 (Experiments 217-218, 3 replications).

Treatment	Dose kg/ha	Beets		Weeds				Yield in T/ha
		Injury	Stand	Rrpw	Colq	Fxtl	Avg.	
		(Scores and seedling counts as % of controls)						
ethofumesate	2.2	17	108	99	79	97	92	41.9
cycloate	2.2	19	105	77	72	85	78	42.0
diclofop-methyl	2.2	3	99	30	42	98	57	39.9
ethofume. + cycloate	2.2+2.2	40	103	100	89	99	96	41.0
ethofume. + diclofop	2.2+2.2	18	104	94	75	100	90	39.8
cycloate + diclofop	2.2+2.2	15	99	70	75	93	79	42.1
ethofume. + cyclo. + diclo.	2.2+2.2+2.2	34	107	100	93	99	97	40.1
diclo. + ethofume. + cyclo.	2.2+1.1+1.1	21	104	94	87	100	94	40.8
Plant count/sq. m untreated or yield			15	33	26	23	--	42.0

Table 2. Effect of sequence applications (PPI/PO) on sugarbeets and weeds at Longmont, CO and Gering, NE, spring 1979 (Experiments 215-216, 3 replications).

Treatment	Dose kg/ha	Beets		Weeds				Yield in T/ha
		Injury	Stand	Rrpw	Colq	Fxtl	Avg.	
		(Scores and seedling counts as % of controls)						
cycloate/phenmedipham + desmedipham	3.4/.4+.4	29	104	97	93	89	93	44.3
cyclo./phenmed. + desmed.	4.5/.4+.4	35	92	99	93	98	97	44.1
ethofumesate/phenmed. + desmed.	2.2/.4+.4	24	104	99	87	98	95	44.4
ethofume./phenmed. + desmed.	3.4/.4+.4	32	99	100	94	99	98	43.8
diethatyl-ethyl/phenmed. + desmed.	3.4/.4+.4	17	96	98	67	88	84	44.6
die-ethyl/phenmed. + desmed.	4.5/.4+.4	13	98	100	65	89	85	46.9
ethofume. + diclofop-methyl/ phenmed. + desmed.	2.2+1.7/.4+.4	29	98	99	89	97	95	43.7
ethofume. + diclo/phenmed. + desmed.	2.8+2.2/.4+.4	22	104	100	94	99	98	43.8
diclo./phenmed. + desmed.	1.7/.6+.6	10	101	70	80	98	83	42.8
Plant count/sq. m untreated or yield			14	24	26	29	79	43.5

Preplant and preemergence treatments for selective weed control in sugarbeets. Schild, L. D. and E. E. Schweizer. Two experimental herbicides were compared to ethofumesate and cycloate for the selective control of kochia, redroot pigweed, and foxtail in sugarbeets.

The treatments were applied 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. On April 22, weed seeds were applied at 15 lb/A on an 8-inch band and incorporated 1½ inches into a dry, cloddy seed bed. All herbicides were sprayed broadcast with water at a volume of 30 gpa. Preplant herbicides were applied and incorporated 1½ inches deep with a rolling cultivator immediately prior to planting on April 22. Following herbicide incorporation, pelleted 'GW Mono-Hy D2' sugarbeet seeds were planted at 3 seeds per row foot. Immediately following planting, the preemergence herbicides were applied. Natural precipitation of 2.43 inches occurred from April 25 to May 4.

The response of sugarbeets and weeds to the herbicides was determined by counting the number of weeds and sugarbeets present in two quadrates, 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.

NC 20484 applied preplant or preemergence at 2 lb/A (see table) suppressed sugarbeets (66 and 73%) more than ethofumesate at 2 lb/A (23%) on June 4. Weed control was similar where NC 20484 was applied preplant or preemergence.

Cycloate with extender controlled weeds as well as cycloate and appeared to suppress sugarbeets less in some replications. Further investigations of cycloate with extender may be warranted. Desmedipham plus phenmedipham applied postemergence over cycloate, cycloate extender, NC 20484, and ethofumesate preplant treatments improved the control of kochia by 28 to 79%. (Western Region, Science and Education Administration, U. S. Department of Agriculture, Fort Collins, Colorado 80523).

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

Treatments			Sugarbeets			Weed control			
Herbicides	Preplant rate	Post rate	Stand reduction	Visual ratings[a] (6/4)	Visual ratings[a] (7/3)	Stand reduction KO[b]	Stand reduction RPW	Stand reduction SE	Visual rating[a] (7/3)
	(lb ai/A)	(lb ai/A)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
NC 20484[c]	1/2		5	45	16	26	93	71	14
NC 20484[c]	1		5	51	26	20	98	96	20
NC 20484[c]	2		1	66	36	62	100	97	55
NC 20484	1/2		4	40	16	31	78	64	29
NC 20484	1		3	59	25	47	97	91	33
NC 20484	2		1	73	46	78	98	100	76
NC 20484 + diclofop	2 + 1½		2	69	43	78	100	100	71
Ethofumesate + diclofop	2 + 1½		5	23	9	37	100	100	68
Ethofumesate	2		0	23	10	53	99	89	73
Diclofop	1½		5	0	1	8	56	100	3
Cycloate	3		2	26	11	14	94	100	26
Cycloate extender	3		6	20	4	19	96	100	14
Cycloate + ethofumesate	1 + 1		2	34	5	61	97	100	74
Cycloate extender + ethofumesate	1 + 1		2	15	4	58	99	92	68
Cycloate + ethofumesate	2 + 2		5	53	21	82	100	100	78
Cycloate extender + ethofumesate	2 + 2		10	64	19	73	100	100	81
Cycloate + D + P[d]	3	1/2 + 1/2	7	56	11	93	100	100	80
Cycloate extender + D + P[d]	3	1/2 + 1/2	7	59	18	88	98	100	85
Ethofumesate + D + P[d]	2	1/2 + 1/2	10	53	19	99	99	100	95
NC 20484 + D + P[d]	2	1/2 + 1/2	24	81	64	100	100	100	98
Check - weeds/sq ft	-	-	-	-		10.2	7.1	2.1	

[a]Visual ratings of 0 = no sugarbeet suppression or weed control and 100 = all plants were killed.

[b]KO = kochia; RPG = redroot pigweed; SE = foxtail species.

[c]NC 20484 applied preemergence.

[d]D + P equals desmedipham plus phenmedipham applied May 24 at 30 gpa. Sugarbeets had 2 to 4 true leaves.

Preplant and postemergence herbicides to control annual weeds in sugarbeets. Jensen, L. B. and J. O. Evans. Experiments were conducted at two different locations in 1978 to determine the efficacy of herbicide combinations under pre and postemergence conditions. Diclofop, a new herbicide not yet registered on sugarbeets plus several herbicides presently registered were evaluated. The plots were 11 by 50 ft. with three replications in a randomized block design. The yield, sugar percent, and stand were evaluated to determine if there was any herbicidal effect upon the sugarbeets. The predominant weeds were barnyardgrass, redroot pigweed, and lambsquarter with barnyardgrass being the predominant weed in the early plantings and redroot pigweed being dominant in the late plantings. There were occasional kochia, nightshade, and purslane but the population was not high enough to be counted in the study.

The preemergence treatments were applied on May 27. The silty loam soil was incorporated in two directions with a Triple-K harrow set three inches deep. Ethofumesate showed excellent weed control by itself. Diclofop had very little broadleaf activity but showed excellent control of barnyardgrass. The ethofumesate and diclofop mixture also showed excellent promise if environmental conditions are favorable for a high grass population. There was a slight injury noted at the high rate of ethofumesate and diclofop mixture but it did not have any effect on yield.

The postemergence treatments were applied May 26 on the early plantings and June 26 on the late plantings. Postemergence treatments were made when the first true leaves were at least one-half inch long. The wet, cool spring was favorable for grass germination and growth. In the early planted beets, the grass was in the 4 to 5 leaf stage when it was treated. Diclofop and ethofumesate showed excellent postemergence activity and gave the most consistant weed control. Diclofop plus phenmedipham and desmedipham gave good weed control but it was not as consistant. Diclofop had excellent activity on the grass species but showed very little effect on the broadleaved weeds. The diclofop and ethofumesate mixture showed the greatest injury to the sugarbeets but there was no effect in yield from the treatments. (Utah Agricultural Experiment Station, Logan, Utah 84322).

T-1 An evaluation of several preplant herbicides for annual weed control in sugarbeets

Treatment	Rate (lb ai/A)	Sugarbeet response #/100 inches of row	Weed response (% control) Redroot pigweed	Lambs-quarters	Night-shade	Shepherds-purse
cycloate + ethofumesate	1.5 + 1.0	15	68	99	97	97
cycloate + ethofumesate	1.5 + 1.5	11	100	99	100	99
cycloate + ethofumesate	2.0 + 1.0	14	100	100	99	99
cycloate + H22234	2.0 + 2.0	14	100	100	97	98
cycloate + H22234	2.0 + 3.0	13	68	98	99	98
ethofumesate + H22234	2.0 + 2.0	10	100	98	90	97
ethofumesate + H22234	2.0 + 3.0	12	100	100	97	96
ethofumesate + diclofop	1.5 + 1.0	14	100	96	84	77
ethofumesate + diclofop	2.0 + 1.5	12	100	99	79	83
ethofumesate + diclofop	3.0 + 2.0	12	68	99	94	99
cycloate + diclofop	2.0 + 2.0	16	100	100	94	88
cycloate + diclofop	2.0 + 3.0	14	100	99	95	96
diclofop (Pre)	2.0	20	0	41	46	32
diclofop (Post)	4.0	20	0	41	46	32
Control		20	0	0	0	0

T-2 An evaluation of several preplant and postemergence herbicides for sugarbeets

Treatment	Method of appl	Rate (lb ai/A)	Sugarbeet response: Beets/ 100 in of row	Beet injury (0-10)	Yield ton/A	Sugar %	Weed response (% control): rp	bg	lq
diclofop	PPI	2.0	28	0	16.88	14.84	29	88	0
diclofop	PPI	4.0	28	0	18.40	15.12	0	78	6
ethofumesate	PPI	3.0	27	0	16.68	14.55	99	100	94
ethofumesate	PPI	6.0	25	0	16.63	14.85	99	100	100
diclofop +	PPI	1.0 +							
ethofumesate	PPI	1.5	26	0	18.94	14.23	96	88	66
diclofop +	PPI	1.5 +							
ethofumesate	PPI	2.0	26	0	17.84	14.88	97	78	85
diclofop +	PPI	2.0 +							
ethofumesate	PPI	3.0	25	0	17.73	14.77	97	100	94
diclofop +	PPI	4.0 +							
ethofumesate	PPI	6.0	25	1	18.75	14.77	100	100	100
diclofop +	PPI	1.5 +							
phenmedipham +	POST	.5 +							
desmediphan	POST	.5	25	0	17.53	14.50	28	100	4
diclofop	POST	2.0	25	0	17.38	14.25	0	86	0
diclofop	POST	4.0	25	0	17.59	14.56	28	60	0
diclofop +	POST	1.5 +							
phenmedipham +	POST	.5 +							
desmedipham	POST	.5	29	1	16.49	14.50	0	88	28
diclofop +	POST	2.0 +							
phenmedipham +	POST	.75 +							
desmedipham	POST	.75	28	1	15.74	14.88	50	86	34
cycloate	PPI	3.0	27	0	18.21	14.58	70	100	73
diclofop +	POST	1.5 +							
ethofumesate	POST	2.0	26	2	17.53	14.46	90	95	78
Control			26	0	17.53	14.74	0	0	0

(rp = redroot pigweed, bg = barnyardgrass, lq = lambsquarter)

T-3 An evaluation of several postemergence herbicides for sugarbeets

Treatment	Rate (lb ai/A)	Sugarbeet response: Beet injury (1-10)	Yield ton/A	Sugar %	Weed response (% control): Redroot pigweed	Barnyard-grass
diclofop	1.5	0	25.94	16.52	53	61
diclofop	2.0	1	24.40	16.16	12	86
diclofop	2.5	0	26.47	16.40	13	78
ethofumesate	1.5	2	25.29	16.10	78	53
ethofumesate	2.0	3	26.33	15.91	81	61
ethofumesate	2.5	3	26.89	15.90	82	61
diclofop + ethofumesate	1.0 + 1.0	3	24.75	16.55	68	82
diclofop + ethofumesate	1.5 + 1.0	3	23.86	16.97	71	78
diclofop + ethofumesate	1.0 + 2.0	3	24.95	15.81	87	82
diclofop + ethofumesate	1.5 + 2.0	3	26.88	16.39	82	90
diclofop + phenmedipham + desmedipham	1.5 + .5 + .5	2	24.28	16.86	79	91
diclofop + phenmedipham + desmedipham	1.5 + .75 + .75	1	25.20	16.44	86	88
dalapon	4.0	0.5	24.99	16.40	2	0
diclofop + pyrazon	1.5 + 6.0	0	27.84	16.54	44	63
diclofop + dalapon	2.0 + 2.0	0.5	28.26	16.12	31	59
Control		0	27.58	16.31	0	0

Preplant and postemergence control of sunflower and velvetleaf in sugarbeets. Bridge, L. D. and E. E. Schweizer. Weed densities of sunflower and velvetleaf are generally low in sugarbeet fields, however, even small populations of these two annual weeds can be very competitive and cause economic yield losses. At present, some sugarbeet fields in northeastern Colorado are moderately infested with sunflower. Velvetleaf, common in neighboring states east of Colorado, has appeared in northeastern Colorado within the last 4 years presenting a potential weed problem. In 1979 an experiment was initiated to evaluate the effectiveness of selected preplanting and postemergence herbicides for controlling sunflower and velvetleaf in sugarbeets.

The experimental design consisted of a randomized complete block, with all treatments replicated four times. Subplots were two rows by 25 feet in length. The soil texture was a loam with 2.1% organic matter and a pH of 7.8.

Annual grasses were controlled by a preplanting incorporated treatment of diclofop applied at 1.5 lb ai/A to all plots on April 20. Ethofumesate was applied at 2.0 ai/A to half of the plots on April 22 and incorporated. Pelleted sugarbeet 'Mono Hy D2' seed was planted at a spacing of one seed per 4 inches of row on April 22. During the planting operation an equal mixture of sunflower and velvetleaf seed was sown in the sugarbeet row at a combined rate of approximately 20 seeds per foot of row. Postemergence treatments and rates are detailed in the accompanying table.

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 subplots has been expressed as a percentage of those weeds present in plots treated only with diclofop.

Main plots treated with the preplanting treatment of diclofop and ethofumesate had slightly smaller, but equal numbers of healthy appearing sunflower and velvetleaf plants, in comparison with main plots treated only preplanting with diclofop. Postemergence applications were sprayed on May 25 and June 1, when the sugarbeets had 4 and 8 leaves, respectively. The sunflower and velvetleaf plants were at the cotyledon to 3-leaf stage at the time of the first postemergence application.

Sugarbeet tolerance was least in the sequential treatment that received a preplanting application of diclofop and ethofumesate followed by two postemergence applications of a mixture of ethofumesate plus phenmedipham plus desmedipham. This sequential treatment reduced the stand of sugarbeets the most, 30%. The other postemergence treatments reduced the stand of sugarbeets 5 to 17%.

Postemergence treatments controlled 89 to 100% of the kochia, common lambsquarters, and redroot pigweed which grew from the indigenous weed seed in the field. The sunflower population was reduced 91% or more by all treatments. Herbicides were less effective on velvetleaf, reducing the stand 10 to 82%. The preplanting treatment of diclofop plus ethofumesate followed by two postemergence applications of a mixture of desmedipham plus endothall (H 273) controlled sunflower and velvetleaf the best, while reducing the stand of sugarbeets only 10%.

Our results show that sequential treatments of diclofop and ethofumesate, applied preplanting, followed by various postemergence treatments were more effective in controlling velvetleaf than sequential treatments of diclofop, applied preplanting, followed by the same postemergence treatments. Sunflower and velvetleaf were controlled by two postemergence applications of the same herbicide mixtures. Sunflower can be controlled satisfactorily with timely applications of presently available herbicides. This preliminary study also indicates that these same herbicides may not control velvetleaf adequately in sugarbeet fields. (Crops Research Laboratory, Colorado State University, and Western Region, Science and Education Administration, U. S. Department of Agriculture, Fort Collins, Colorado 80523)

Evaluation of preplanting and postemergence herbicides for controlling sunflower and velvetleaf in sugarbeets

Herbicide treatments		No. of		Sugarbeet stand	Weed stand reduction[c]				
Preplanting[a]	Postemergence[b]	applications	Rate	reduction	SF	VL	KO	PW	LQ
			(lb ai/A)	(%)	(%)				
Dicl + eth	Phen + desm	1	0.5 + 0.5	6	93	26	100	100	100
Dicl + eth	Eth + phen + desm	1	1.5+0.375+0.375	12	92	40	100	100	100
Dicl + eth	Desm + endothal	1	1.0 + 1.0	8	92	75	100	100	100
Dicl + eth	Phen + desm	2	0.375 + 0.375	17	99	50	100	100	100
Dicl + eth	Eth + phen + desm	2	1.12+0.28+0.28	30	99	82	100	99	100
Dicl + eth	Desm + endothall	2	0.75 + 0.75	10	98	80	96	100	100
Diclofop	Phen + desm	1	0.5 + 0.5	6	91	10	92	92	100
Diclofop	Eth + phen + desm	1	1.5+0.375+0.375	5	96	44	100	100	100
Diclofop	Desm + endothall	1	1.0 + 1.0	9	98	24	89	99	100
Diclofop	Phen + desm	2	0.375 + 0.375	9	95	13	93	96	100
Diclofop	Eth + phen + desm	2	1.12+0.28+0.28	10	100	61	100	100	100
Diclofop	Desm + endothall	2	0.75 + 0.75	5	100	37	87	100	100
Diclofop	Untreated	weeds/sq. ft.			2.25	2.48	1.09	4.16	0.94

[a]Diclofop (dicl) at (1.5 lb ai/A) and ethofumesate (eth) at (2.0 lb ai/A)

[b]Phenmedipham (phen), desmedipham (desm), ethofumesate (eth), endothall (H 273)

[c]SF = sunflower, VL = velvetleaf, KO = kochia, PW = redroot pigweed, LQ = common lambsquarters

Postemergence herbicide combinations for control of common knotweed in sugarbeets. Norris, R. F., F. Kegel, and R. A. Lardelli. There are several herbicides available for selective control of weeds in sugarbeets. Some weed species have proved difficult to control with these herbicides; one such species is common knotweed. Previous experiments have indicated that a mixture of phenmedipham and ethofumesate provided better control of this weed than either herbicide alone.

A severe common knotweed infestation developed in part of a sugarbeet field on Upper Jones Tract, near Stockton, California. The sugarbeets had been sowed on Feb. 22, 1979 and a series of herbicide treatments were applied postemergence on March 9, 1979. The knotweed was 0.5 to 1.5 inches tall, and the sugarbeets had 2 to 4 leaves at the time of treatment. A CO_2 backpack sprayer with 8002E nozzles operated at 30 psi delivered 40 gal/A of spray solution. The plot size was 2 beds (30 inch centers) by 20 ft, and each treatment was replicated three times in a randomized block design. The soil was a clay/loam; the field was furrow irrigated but in addition received light rainfall on March 16 and March 30, 1979.

The treatments did not kill any sugarbeets. The greatest reductions in sugarbeet vigor occurred as a result of competition where common knotweed control was poor; hence the low vigor ratings for the untreated check plots. No consistent vigor reductions could be attributed to herbicide treatments.

Common knotweed control was only partial with phenmedipham, and seemed to show little relation to increasing application rate. Ethofumesate applied at 2.0 lb/A or less also only gave partial knotweed control; the 2.5 lb/A rate of ethofumesate did give good control of the weed. Mixtures of phenmedipham and ethofumesate provided excellent selective knotweed control; many combinations of rates were effective. The flowable formulation of ethofumesate was used in some treatments; it did not provide as much activity as that from the EC formulation. The results of this trial strongly suggest that phenmedipham and ethofumesate show synergistic action when used for control of common knotweed. (Botany Department, University of California, Davis, and Cooperative Extension, Stockton).

Common knotweed control in sugarbeets with postemergence herbicides

Treatment	Rate lb/A	Sugarbeet vigor 4/5	Sugarbeet vigor 4/19	Knotweed control 4/5	Knotweed control 4/19
Untreated check	-	8.8	7.2	0.0	0.0
phenmedipham	0.75	9.5	8.0	4.0	5.3
phenmedipham	1.0	8.3	7.8	5.0	5.7
phenmedipham	1.5	9.2	8.3	4.8	5.5
ethofumesate	1.0	9.5	9.0	3.5	5.0
ethofumesate	1.5	9.7	8.3	5.2	5.0
ethofumesate	2.0	9.0	7.5	4.8	5.3
ethofumesate	2.5	9.7	9.5	6.8	8.3
ethofumesate (flowable)	1.5	9.2	6.2	1.0	2.7
phenmedipham + ethofumesate	0.75 + 1.0	9.7	9.5	7.3	8.3
phenmedipham + ethofumesate	0.75 + 1.5	9.2	9.0	9.5	9.3
phenmedipham + ethofumesate	0.75 + 2.0	9.3	9.7	8.2	9.2
phenmedipham + ethofumesate	0.75 + 2.5	8.3	8.7	9.5	9.8
phenmedipham + ethofumesate	1.0 + 1.0	8.0	8.5	8.5	8.8
phenmedipham + ethofumesate	1.0 + 1.5	8.8	9.3	8.7	8.8
phenmedipham + ethofumesate	1.0 + 2.0	7.5	7.8	9.0	9.0
phenmedipham + ethofumesate	1.0 + 2.5	8.0	7.5	9.5	9.4

All data are means of three replications. Vigor: 0 = dead, 10 = normal; control: 0 = none, 10 = complete kill.

Evaluations of postemergence tank-mix treatments for selective weed control in sugarbeets. Schild, L. D., and E. E. Schweizer. A tank mix of NC 20484 plus desmedipham plus phenmedipham was compared to tank mixtures of ethofumesate or diclofop with desmedipham plus phenmedipham for the selective control of kochia, redroot pigweed, common lambsquarters, and foxtail in sugarbeets.

The experiment was conducted on a sandy loam soil with 1.7% organic matter and a pH of 7.7. Plot size was 2 rows by 25 ft. All treatments were replicated four times using a randomized complete block design. Weed seeds were applied as a mixture on an 8-inch band at 15 lb/A prior to sugarbeet planting to assure a good stand of weed densities. Herbicides were applied broadcast in water on May 24 with a bicycle sprayer at a total volume of 30 gpa. Air temperature at application was 56 F. Stages of growth at application were: sugarbeets 4-true leaves; kochia 20 to 70 mm in diameter, 5 to 40 mm in ht; redroot pigweed 2 to 4 true leaves, 15 to 25 mm in ht; and foxtail 3 to 4 true leaves, 10 to 50 mm in ht. Precipitation one week prior to application totaled 0.49 inch, and 0.40 inch one week following application.

The response of sugarbeets and weeds to the herbicide mixtures was determined by counting the number of weeds and by visually assessing crop vigor. Weeds were counted in two quadrates, each 4 inches by 10 ft, per treatment from each replication. The stand of weeds in the treated plots has been expressed as a percentage of those weeds present in the untreated plots.

Sugarbeet stands were reduced 61% by the mixture of NC 24084 plus desmedipham plus phenmedipham (see table). Foliar sugarbeet suppression was 93%.

The most effective herbicide treatment was diclofop plus desmedipham plus phenmedipham applied at 1 + 1/2 + 1/2 lb ai/A. This treatment reduced the stand of all weeds by 92% or more, with only 20% sugarbeet suppression. NC 20484 plus desmedipham plus phenmedipham controlled weeds as well as ethofumesate plus desmedipham plus phenmedipham, but was too phytotoxic to sugarbeets. Desmedipham plus phenmedipham (1/2 + 1/2 lb ai/A) did not reduce kochia (71%) or foxtail (40%) stands satisfactorily, but this mixture controlled redroot pigweed (99%) and common lambsquarters (100%). (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				Visual rating[c]	
Herbicides	Rate	Stand reduction	Visual[a] rating	KO[b]	RPG	LQ	SE	KO	RPG-LQ
	(lb ai/A)	(%)							
Desmedipham + phenmedipham	1/2 + 1/2	4	13	71	99	100	40	78	100
Diclofop + desmedipham + phenmedipham	1 + 1/2 + 1/2	11	20	91	99	95	92	91	100
Ethofumesate + desmedipham + phenmedipham	1 1/2 + 1/2 + 1/2	11	63	99	100	100	94	99	100
NC 20484 + desmedipham + phenmedipham	1 1/2 + 1/2 + 1/2	61	93	99	100	100	93	96	100
Check - weeds/sq. ft.	-	-	-	12.0	10.1	1.2	3.2	-	-

[a]Evaluations - June 1. Ratings of 0 = no sugarbeet suppression and 100 = all plants were killed.

[b]KO = kochia; RPG = redroot pigweed; LQ = common lambsquarters; SE = foxtail species.

[c]Evaluations - June 1. Ratings of 0 = no weed control and 100 = all plants were killed.

Postemergence herbicide treatments for weed control in sugarbeets. Alley, H. P. and N. E. Humburg. Mono Hy D_2 sugarbeet seed was planted April 25, 1979. Initial herbicide treatments were made on May 24 when sugarbeets were in the 2-leaf stage of growth. Weed stages of growth were: wild buckwheat, 2 to 3 leaves; and common lambsquarters, 2 to 6 leaves. Herbicides were applied full-coverage with a knapsack sprayer that delivered 40 gpa of water solution. Herbicides were applied between 8:30 and 10:00 a.m. MDT with environmental conditions of no wind and clear sky. Sequential treatments were made on May 30. The loam soil (51.6% sand, 27.6% silt and 20.8% clay) had a pH of 8.1 and 1.4% organic matter.

Stand counts and weed population counts were made on June 7. Ethofumesate + desmedipham at 1.0 + 1.0 lb/A markedly reduced sugarbeet stand. All treatments of phenmedipham or desmedipham, as well as combinations of these herbicides with metolachlor, diclofop or ethofumesate, generally were the most effective treatments in the study. Ethofumesate + diclofop and M-3972 + diclofop gave a low order of herbicidal activity; however, when plots were visually evaluated on October 2, plots treated with M-3972 + diclofop were the outstanding plots in the study. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-992).

Postemergence herbicide treatments for weed control in sugarbeets

Treatment[1]	Rate lb/A	Sugarbeet stand[2] %	Percent control[2] wild buckwheat	Percent control[2] common lambsquarters
metolachlor + desmedipham	2.0 + 0.5	100	81	87
metolachlor + desmedipham	3.0 + 0.5	76	75	99
diclofop + [desmedipham]	1.5 + 1.0	59	77	100
diclofop + [desmedipham]	2.0 + 1.0	83	58	99
diclofop + [desmedipham + phenmedipham]	1.5 + 0.5 + 0.5	53	83	99
diclofop + [desmedipham + phenmedipham]	2.0 + 0.5 + 0.5	88	91	100
desmedipham + [desmedipham]	1.0 + 1.0	81	97	90
desmedipham	1.0	66	76	99
phenmedipham	1.0	100	91	100
phenmedipham + desmedipham	0.5 + 0.5	61	95	99
ethofumesate + desmedipham	0.5 + 1.0	93	93	97
ethofumesate + desmedipham	1.0 + 1.0	25	99	100
ethofumesate + diclofop	1.0 + 1.0	100	0	0
ethofumesate + diclofop	1.0 + 1.5	88	9	22
ethofumesate + diclofop	1.5 + 1.0	100	0	16
ethofumesate + diclofop	1.5 + 1.5	90	10	35
M-3972 + diclofop	0.12 + 1.0	100	0	24
M-3972 + diclofop	0.25 + 1.0	100	20	42
M-3972 + diclofop	0.5 + 1.0	100	62	58
Check	---	100	0	0
plants/ft of row, 3-in. band		*1.0*	*2.5*	*2.4*

[1]Herbicides applied May 24, 1979. [Sequential herbicide treatments] applied May 30, 1979.
[2]Sugarbeet and weed counts June 7, 1979.

Evaluation of postemergence split-applications for weed control in sugarbeets. Schild, L. D. and E. E. Schweizer. Herbicidal activity of desmedipham plus phenmedipham when applied alone, or tank-mixed with ethofumesate were compared for the selective control of redroot pigweed, black nightshade and foxtail in sugarbeets.

Diclofop (1½ lb ai/A) was incorporated into the seed bed on April 20 to control grasses. The seed bed consisted of a loam soil with 2.1% organic matter and a pH of 7.8. Herbicide treatments were randomized four times within a randomized complete block design. Herbicides were applied broadcast in water on May 22 (first application) and on May 29 (second application) with a tractor sprayer at a volume of 50 gpa. Stages of growth at application were: sugarbeets 4 true leaves; redroot pigweed 2 to 4 leaves, 10 to 20 mm in ht; black nightshade prostrate to 15 mm in ht, 10 to 50 mm in diameter; and foxtail 3 to 4 leaves, 10 to 50 mm in ht. Weed populations were natural. Precipitation three days prior to the first application totaled 0.23 inch, 0.35 inch between applications, and 0.53 inch after the second application.

The response of weeds and sugarbeets to the herbicide mixtures was determined by counting the number of weeds and by visually assessing crop vigor. Weeds were counted in two quadrates, each 4 inches by 10 ft, per treatment from each replication. The stand of weeds in the treated plots has been expressed as a percentage of those weeds present in the untreated plots.

Repeat applications of desmedipham plus phenmedipham (0.375 + 0.375 lb/A) reduced redroot pigweed, black nightshade, and grass stands 42, 33 and 28% more, respectively, (see table) than one application at 1/2 + 1/2 lb ai/A. One application of ethofumesate plus desmedipham plus phenmedipham (1½ + 0.375 + 0.375 lb ai/A) controlled these broadleaf weeds better than the repeat application of desmedipham plus phenmedipham, but resulted in 47% less grass control. Complete broadleaf control was obtained from two applications of ethofumesate plus desmedipham plus phenmedipham at 1.125 + 0.28 + 0.28 lb/A. Ethofumesate tank-mixed with desmedipham plus phenmedipham increased broadleaf control, but was antagonistic towards grass control. (Western Region, Science and Education Administration, U. S. Department of Agriculture, Fort Collins, Colorado 80523).

Response of sugarbeets and weeds to postemergence herbicides applied as single or repeat applications
(Fort Collins, Colorado)

Treatments			Sugarbeets		Weed control			
					Stand reduction			
Herbicide	No. applications[a]	Rate	Stand reduction	Visual rating[b]	RPG[c]	NS	SE	Visual rating[d] broadleaves
		(lb ai/A)	(%)					
Desmedipham + phenmedipham	1	0.5 + 0.5	6	1	48	47	46	83
Desmedipham + phenmedipham	2	0.375 + 0.375	4	13	90	80	74	99
Ethofumesate + desmedipham + phenmedipham	1	1.5 + 0.375 + 0.375	6	13	97	99	27	96
Ethofumesate + desmedipham + phenmedipham	2	1.125 + 0.28 + 0.28	4	18	100	100	59	99
Check - weeds/sq ft		-	-	-	8.1	2.6	2.1	-

[a]First application - May 22. Second application - May 29.

[b]Visual ratings of 0 = no sugarbeet suppression and 100 = all plants were killed.

[c]RPG = redroot pigweed; NS = black nightshade; SE = grasses.

[d]Evaluations - June 4. Ratings at 0 = no weed control and 100 = all plants were killed.

Evaluation of new herbicide formulations of desmedipham and phenmedipham for selective postemergence weed control in sugarbeets. Schild, L. D. and E. E. Schweizer. Herbicidal activity of desmedipham and phenmedipham when formulated from wettable powders versus emulsifiable concentrates were compared for selective control of kochia, redroot pigweed, and foxtail in sugarbeets.

The experiment was conducted on a loam soil with 2.1% organic matter and a pH of 7.8. Herbicides were applied broadcast in water at 30 gpa on May 24. Treatments were replicated four times, using a randomized complete block design. Stages of growth at application were: sugarbeets 4 true leaves; kochia 20 to 30 mm in diameter and in rosette stage; redroot pigweed 2 to 4 leaves and prostrate; and foxtail 3 to 4 leaves and 10 to 50 mm in ht. Precipitation 5 days prior to application totaled 0.49 inches and 0.55 inches seven days following application.

The response of sugarbeets and weeds to the herbicides was determined by counting the number of weeds and by visually assessing crop vigor. Weeds and sugarbeets were counted in two quadrates, each 4 inches by 10 ft, per treatment, from each of four replications. The stand of weeds in the treated plots has been expressed as a percentage of those weeds present in the untreated check plots.

The stand of sugarbeets was reduced 10% or less (see table). Foliar sugarbeet suppression was rated 15% or less for all treatments.

Kochia was controlled best by the emulsifiable concentrates with stands being reduced 73% by desmedipham and 62% by phenmedipham. Wettable powder formulations reduced stands 34% or less.

Control of redroot pigweed was 99 and 94% by desmedipham emulsifiable concentrate and wettable powder formulations, respectively. Phenmedipham reduced stands 16% or less.

Emulsifiable formulations of phenmedipham and desmedipham controlled foxtail the best (73 and 54%, respectively). The addition of Sunspray 11E to wettable powder formulations generally increased herbicidal activity for phenmedipham, but it decreased activity when added to desmedipham. This trend was also evident in kochia and redroot pigweed. (Western Region, Science and Education Administration, U. S. Department of Agriculture, Fort Collins, Colorado 80523).

Response of sugarbeets and weeds to two formulations of desmedipham and phenmedipham
(Fort Collins, Colorado)

Treatments			Sugarbeets		Weed control				
					Stand reduction			Visual ratings[b]	
Herbicide	Rate	Formulation[a]	Stand reduction	Visual[b] rating	KO[c]	RPG	SE	KO	RPG
	(lb ai/A)		%						
Phenmedipham	1	EC	7	3	62	5	73	83	5
Phenmedipham	1	WP	6	0	11	12	40	10	0
Phenmedipham + sunspray 11E	1 + 1/2% v/v	WP	5	4	13	16	50	15	0
Desmedipham	1	EC	10	6	73	99	54	95	100
Desmedipham	1	WP	9	15	34	94	44	74	100
Desmedipham + sunspray 11E	1 + 1/2% v/v	WP	1	9	19	88	7	54	99
Check - weeds/sq. ft.		-	-	-	11.1	8.1	2.1	-	-

[a]EC = 1.3 ppg emulsifiable concentrate, WP = 25% wettable powder.

[b]Ratings - June 1. Ratings of 0 = no sugarbeet suppression or weed control and 100 = all plants were killed.

[c]KO = kochia; RPG = redroot pigweed; SE = foxtail species.

Pre-plant incorporated herbicide screening trial in sunflowers. Handly, J. H., G. A. Lee, D. L. Auld, G. A. Murray, and W. S. Belles. This study was established to evaluate the performance of 4 herbicides for preplant use in sunflowers (cultivar 894). This study was established at Moscow, Idaho on an 8 percent east facing slope. All herbicides were applied on May 21, 1979 with a knapsack sprayer equipped with a 3 nozzle boom and calibrated to deliver 40 gpa. Air temperature and soil temperature at 6 inches were 65 F and 59 F, respectively. A 2 mph breeze was blowing from the west at the time of herbicide application. The herbicides were incorporated into the soil to a depth of 2 inches with a disc pulled at 3 mph in two directions over the field. Plots were arranged in a randomized complete block design with 3 replications, plots were 7 by 20 ft. The plots were hand thinned in June to 1 plant/ft of row. Visual evaluations were taken July 17, 1979 to determine vigor reduction of the crop and percent weed control. The study was harvested with a Hege plot combine.

No herbicide resulted in significant reduction of crop vigor (accompanying table). Because of dry soil conditions which persisted throughout the study period, no herbicide treatment gave outstanding control of the weed species present. Vernolate and EPTC did, however, provide better control of redroot pigweed than napropamide or cycloate. Prostrate pigweed and the mustard species populations were sporatic because of dry soil conditions and adequate weed control was not obtained with any herbicide treatment.

Sunflower yields of 1770 lb/A or greater were obtained from plots treated with cycloate at 2.0 lb/A and vernolate at 6.0 lb/A. Under dry soil conditions, the herbicidal activity of the various herbicides were reduced on both the crop and weeds. Differential response of the sunflower crop to the range of herbicide rates would be expected under adequate soil moisture conditions. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Pre-plant incorporated herbicide screening trial in sunflowers
Moscow, Idaho 1979

			Percent Control				
Treatment	Rate lb/A	Crop VR[1]	Redroot pigweed	Mustard species	Prostrate pigweed	Yield lb/A	% Yield by wt. of check
check	-	0a	0c	0a	0b	1446a-c	100a-c
napropamide	1.0	7a	15bc	7a	0b	1594a-c	111a-c
napropamide	2.0	5a	30a-c	20a	30ab	1358a-c	95a-c
cycloate	2.0	8a	0c	40a	0b	1792a	128a
cycloate	3.0	1a	50a-c	44a	35ab	1375a-c	96a-c
cycloate	4.0	0a	37a-c	60a	30ab	1174c	84c
cycloate	6.0	2a	77ab	55a	23ab	1538a-c	107a-c
vernolate	2.0	3a	77ab	17a	27ab	1260b-c	89b-c
vernolate	3.0	3a	57a-c	0a	42ab	1594a-c	110a-c
vernolate	4.0	0a	80a	73a	37ab	1596a-c	113a-c
vernolate	6.0	3a	63ab	62a	63ab	1776a-b	123a-b
EPTC	2.0	3a	60a-c	55a	67ab	1114c	79c
EPTC	3.0	7a	83a	63a	77a	1437a-c	99a-c
EPTC	4.0	3a	68ab	13a	52ab	1208c	85c
EPTC	6.0	3a	70ab	30a	37ab	1551a-c	109a-c

Means with the same letter are not significantly different at the .05 level.

VR[1]= vigor reduction

Tolerance of sunflower and safflower to in-furrow herbicide applications. Handly, J. V., G. A. Lee, and E. P. Eldredge. This study was initiated at Moscow, Idaho on May 30, 1979 to test the feasibility of placing herbicides directly in the seed furrow and to test crop tolerance with sunflower and safflower. All herbicides were applied in the furrow with a hand-held syringe. Rates were calculated for a band width of 1.5 inches on either side of the furrow or 3 inches over-all width. The solution was gravity fed from the syringe and the speed was adjusted to deliver 40 gpa total carrier to the furrow. Furrows were 2 inches deep and created by hand with a section of flat steel 5 ft long. The steel was placed on edge in the soil and worked cross-wise to produce a "V" shaped furrow. After application of herbicide in the bottom of the furrow the crop was hand seeded at a rate of one seed every 2 inches. The row was then covered with soil. The soil at this site is a Palouse silt loam with a pH of 6.5 and 3.5% organic matter. Soil moisture at 0 inches to 3 inches was 8.8% and 12.7% at 3 inches to 6 inches by weight. At time of application the sky was clear and the air temperature was 61 F. The study was arranged in a randomized complete block design with 3 replications and a plot size of 5 ft by 5 ft consisting of 4 rows each. Visual evaluations were taken on July 9, 1979 to determine stand and vigor reduction.

Crop tolerance to herbicide applications was observed to be low with in-furrow treatments. Both the sunflower and safflower plants suffered stand and vigor reductions with most of the treatments studied. Plots treated with EPTC at 6 lb ia/A had the greatest reductions in stand and vigor for both crops. This went from a 100 percent stand and vigor reduction in safflowers to 72 percent stand reduction and 92 percent vigor reduction in sunflowers. While other treatments produced less damage almost all gave unacceptable vigor reductions, stand reductions or both. Treatments that showed promise are butylate plus R-25788 in sunflowers and safflowers, and cycloate in sunflowers. Both of these compounds gave stand reductions of 10 percent or less and fairly low vigor reductions at the lower rates of 2 and 4 lb ai/A for cycloate and 3 and 6 lb ai/A for butylate plus. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Direct herbicide placement in
safflower and sunflower seed furrow
Moscow, Idaho 1979

Treatment	lb/A	Sunflower SR[1]	Sunflower VR[2]	Safflower SR	Safflower VR
check	0	0d	0h	0f	0g
EPTC + R-25788	2	0d	73a-d	12ef	47c-f
EPTC + R-25788	4	0d	80a-c	53b-d	70a-d
EPTC + R-25788	6	30bc	80a-c	88ab	87ab
EPTC + R-33855	2	17b-d	70a-c	40de	53b-d
EPTC + R-33855	4	17b-d	80a-c	52cd	72a-c
EPTC + R-33855	6	17bd	85a-c	87a-c	68a-d
EPTC	2	15b-d	73a-d	50d	43c-f
EPTC	4	93a	88ab	53b-d	77a-c
EPTC	6	72a	92a	100a	100a
EPTC +	2	17b-d	53de	7ef	47c-f
EPTC +	4	13b-d	80a-c	10ef	63a-d
EPTC +	6	72a	85a-c	67a-d	73a-c
cycloate	2	0d	3gh	13ef	17e-g
cycloate	4	0d	5gh	57b-d	43c-f
cycloate	6	2cd	30f	87a-c	53b-c
vernolate plus R-25788	2	7b-d	40ef	15ef	53b-d
vernolate plus R-25788	4	8b-d	67bc	33ef	77a-c
vernolate plus R-25788	6	17b-d	80a-c	98a	66a-d
vernolate	2	3cd	20f-h	37de	50b-e
vernolate	4	7b-d	63cd	61b-d	79a-c
vernolate	6	33b	70a-d	99a	96a
butylate plus R-25788	3	0d	0h	8ef	13g
butylate plus R-25788	6	0d	0h	10ef	33d-g
butylate plus R-25788	9	2cd	23fg	7ef	67a-d

Means followed by the same letter are not significantly different at the .05 level.

[1] SR=stand reduction

[2] VR-vigor reduction

Comparison of preplant incorporated herbicides and/or combinations for weed control in dryland sunflower. Alley, H. P., G. L. Costel and N. E. Humburg. A field study was established on the Sheridan Research and Extension Center to determine the effectiveness of several herbicides and/or combinations for annual weed control in dryland sunflower (variety Sunbred 212) and to assess crop tolerance to the treatments. Preplant herbicides were broadcast-applied in water on May 8, 1979, with a 6-nozzle knapsack unit calibrated to deliver 40 gpa. Plots were 9 ft by 30 ft arranged in a randomized complete block design with three replications. Immediately after application the herbicides were incorporated with a Triple-K unit 2.5 inches deep once across the direction of herbicide application. The sunflower seed was planted following the incorporation of the herbicides. Air temperature was 40 F, relative humidity was 75%, and soil temperatures were 52, 48, 48 and 47 F at the surface and 1, 2 and 4 inches, respectively. Soil was a loam (47.4% sand, 29.4% silt, 23.2% clay, 2.3% organic matter, and 6.4 pH). Heavy snow with 0.42 inches moisture was received within two hours of application.

Percentage weed control and sunflower stand were determined by counting the weeds and sunflower in two 2.5-ft diameter circular quadrats per replication. All combinations which included metolachlor/chloramben, metolachlor/EPTC, profluralin/chloramben, trifluralin/EPTC, and alachlor/EPTC were effective on the weed species common to the experimental site. Individual herbicide treatments, with the exception of alachlor, did not result in weed control comparable to the mixtures. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-995).

Sunflower stand and weed control

Herbicide	Rate lb ai/A		Pct. control PPW	RPW	DM[1]	Sunflower stand, %
pendimethalin	1.0		16	70	33	81
pendimethalin	1.5		86	92	78	90
diclofop	0.75		0	70	62	90
diclofop	1.0		0	0	45	92
diclofop	2.0		0	0	50	89
metolachlor 8E	2.0		42	85	89	84
metolachlor 8E	3.0		80	92	73	80
metolachlor 8E/chloramben	1.5	+ 2.0	89	92	89	91
metolachlor 8E/chloramben	1.5	+ 3.0	93	100	100	80
metolachlor 8E/chloramben	2.0	+ 2.0	90	100	100	87
metolachlor 8E/EPTC	1.5	+ 2.0	82	100	100	94
metolachlor 8E/EPTC	1.5	+ 3.0	90	100	100	98
metolachlor 8E/EPTC	2.0	+ 2.0	88	100	100	100
profluralin	1.0		86	92	95	100
profluralin/chloramben	0.75	+ 2.0	82	92	95	99
profluralin/chloramben	1.0	+ 2.0	92	92	89	95
EPTC	3.0		3	92	89	89
EPTC	4.0		66	100	95	99
vernolate	3.0		75	85	89	96
vernolate	4.0		84	92	100	98
cycloate	3.0		18	23	78	94
cycloate	4.0		60	70	89	100
trifluralin	0.625		86	100	89	100
trifluralin	0.75		77	100	89	99
trifluralin/EPTC	0.625	+ 2.0	84	100	67	100
trifluralin/EPTC	0.75	+ 2.0	93	93	89	92
ethalfluralin	0.625		87	100	78	95
ethalfluralin	0.75		82	93	95	100
ethalfluralin/EPTC	0.625	+ 2.0	97	93	78	89
ethalfluralin/EPTC	0.75	+ 2.0	91	100	100	100
alachlor	3.0		91	93	89	98
alachlor/chloramben	2.5	+ 1.5	100	100	100	94
alachlor/trifluralin	2.5	+ 0.5	97	93	73	96

[1]Abbreviations: PPW = prostrate pigweed; RPW = redroot pigweed; DM = dwarf mallow.

Comparison of surface-applied preemergence herbicides and/or combinations for weed control in dryland sunflower. Alley, H. P., G. L. Costel and N. E. Humburg. A field study was established at the Sheridan Research and Extension Center to determine the effectiveness of three individual herbicides and combinations of metolachlor/chloramben and alachlor/chloramben for annual weed control in dryland sunflowers (variety Sunbred 212). The preemergence treatments were applied on May 8, 1979 with a 6-nozzle knapsack unit calibrated to deliver 40 gpa. Plots were 9 ft by 30 ft arranged in a randomized complete block with three replications. Air temperature was 40 F, relative humidity 75%, with soil temperatures 52, 48, 48 and 47 F at the soil surface and 1, 2 and 4 inches, respectively. Soil was a loam (47.4% sand, 29.4% silt, 23.2% clay, 2.3% organic matter with a 6.4 pH). Heavy snow with 0.42 inches moisture was received within 2 hours of herbicide application.

Percent weed control and corn stand were determined by counting the weeds and sunflower in two 2.5-ft diameter circular quadrats per replication. Combinations of metolachlor/chloramben and alachlor/chloramben gave 95% or greater control of the weed species recorded. Metolachlor was not effective when applied alone, alachlor was effective as an individual herbicide treatment giving better than 90% control of the two pigweed species. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-994).

Sunflower stand and weed control

Herbicide	Rate lb ai/A	Weed control		Sunflower stand
		PPW	RPW[1]	
metolachlor	2.0	61	87	81
metolachlor	3.0	37	91	94
metolachlor/chloramben	1.5 + 2.0	95	100	88
metolachlor/chloramben	1.5 + 3.0	100	100	96
metolachlor/chloramben	2.0 + 2.0	98	100	89
alachlor	3.0	91	96	83
alachlor/chloramben	2.5 + 1.5	95	100	96
alachlor/chloramben	2.0 + 2.5	99	100	91
R-40244	0.5	69	70	97
R-40244	1.0	76	57	81

[1]Abbreviations: PPW = prostrate pigweed; RPW = redroot pigweed.

Comparison of three herbicide treatments for chemical fallow. Eldredge, E. P., G. A. Lee, G. A. Mundt. On October 27, 1977 a field study was initiated to evaluate treatments with atrazine alone and in combination with cyanazine and dalapon for chemical fallow. Herbicide treatments were applied to a disced wheat stubble field near Preston, Idaho. A motorized plot sprayer with a 15 ft boom was used to apply the herbicide treatments to 90 ft by 400 ft plots in 22 gpa of water carrier. Air temperature was 55 F, soil temperature at the 6 inch depth was 56 F, relative humidity was 31% and wind speed was 1 to 5 mph. Plots were visually evaluated June 1, 1978 for weed control. Atrazine + dalapon at .5 + 2.25 lb ai/A gave excellent control for all weed species present (accompanying table). Atrazine + cyanazine at .27 + 2.4 lb ai/A and atrazine + dalapon at .5 + 2.25 lb ai/A gave excellent control of testiculate buttercup. Atrazine alone at .4 lb ai/A was not as effective as atrazine + cyanazine or atrazine + dalapon. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Influence of three herbicide treatments on the weed population in an eco-fallow system

		Percentage control				
Treatment	Rate lb/A	Volunteer wheat	Downy brome	Testiculate buttercup	Small seed false flax	Tumble mustard
atrazine + cyanazine	.27+2.4	70	85	100	60	0
atrazine + dalapon	.5+2.25	95	99	100	100	100
atrazine	.4	80	90	75	98	70

The response of 6 red and 3 durum wheats to 6 herbicides, Heathman, E. S., D. R. Howell. Observations in Arizona have indicated that some varieties of wheat were sensitive to certain herbicides used for weed control. Where weed populations are sufficient to effect grain yields, adverse crop response to the herbicide controlling the weeds may not be measurable. In this test, a herbicide was applied over an established wheat variety test where weed populations were low. The wheat was planted December 12, 1978 in dry, clay loam soil and irrigated up. The test was located in the Yuma Valley on the Cummings and Sons Farm. The 9 varieties were planted with a drill in 24 ft. wide strips the length of the field replicated 4 times in a randomized complete block design. The 6 herbicides were applied January 30 with compressed air sprayers in a 10 ft. wide strip across each variety and replication. Each herbicide plot was 10 ft. wide and 24 ft. long. There was a 20 ft. check area between each herbicide strip. All herbicides were applied in 20 gpa of water except barban applied at 6 gpa. The wheat was in the 5 leaf to tillering stage. Some littleseed canarygrass was present, 0 to 3 per sq. ft. The field was flood irrigated. Applications of dicamba, 2,4-d, amine, and bromoxynil had little or no effect on any wheat variety at any stage and were not harvested for yield. The other herbicide treatments were harvested for yield June 14, 1979 with a 4.6 ft. wide swath from the center of each plot. Each plot was weighed in the field without recleaning. The wheat was mature and dry. Estimates of lodging by variety were made before harvest. Percent injury to wheat was estimated throughout the season. The wheat was headed out when % stunt was estimated April 17.

Difenzoquat severely stunted NK Aldura and Mexicali durum wheat season long. Yields of Aim, WS13, Zaragosa, NK Aldura, and Mexicali were significantly reduced by difenzoquat. Barban stunted and reduced the yield of Zaragosa. Diclofop had little effect on any variety tested. If weed pressure had been heavy stunting and yield loss would have been hard to measure on the varieties Aim, WS13, and Zaragosa. (Plant Sciences Department, University of Arizona, Tucson, AZ 85721).

Percent stunt to wheat April 17, % lodging variety and calculated yield of wheat in lb/A June 14, from 3 herbicides on 9 varieties of wheat.

Variety	Type	Treatment	Stunt	lodging	Yield lb/A
Cajeme	Red	difenzoquat	0	35	7130 a*
		diclofop			7920 a
		barban			8320 a
		Check			7130 a
Yecoro Rojo	Red	difenzoquat	4	10	7530 a
		diclofop	2		8320 a
		barban	7		8320 a
		Check	0		8710 a
NK Probred	Red	difenzoquat	0	6	8320 a
		diclofop	1		8320 a
		barban	9		8710 a
		Check	0		8320 a
Aim	Red	difenzoquat	15	50	4750 b
		diclofop	0		7130 a
		barban	11		7130 a
		Check	0		5940 ab
WS13	Red	difenzoquat	5	87	4750 b
		diclofop	4		6340 a
		barban	10		6730 a
		Check	0		7920 a
Zaragosa	Red	difenzoquat	20	7	6730 b
		diclofop	6		7920 a
		barban	30		6340 b
		Check	0		7920 a
WBP 1000 D	Durum	difenzoquat	5	6	7520 a
		diclofop	4		8320 a
		barban	15		7920 a
		Check	0		7920 a
NK Aldura	Durum	difenzoquat	42	7	1980 b
		diclofop	2		7920 a
		barban	7		7520 a
		Cehck	0		7130 a
Mexicali	Durum	difenzoquat	57	80	4360 b
		diclofop	0		7920 a
		barban	9		9110 a
		Check	0		6340 a

*Means in the same column and under the same variety followed by the same letter are not significantly different at the 5% level of probability.

The effect of 3 herbicides on 4 red and 4 durum wheats. Heathman, E. S., and D. E. Howell. The wheat varieties were planted with a drill on the Yuma Valley Experiment Station in January 1979, in a clay loam soil and irrigated up. Each variety was planted in a 10 ft. strip, 120 ft. long replicated 4 times in a randomized complete block design. The herbicide treatments were 30 ft. long subplots in each variety strip. Herbicides were applied February 8th when the wheat was 3 to 7 leaf with a compressed air sprayer. Diclofop and difenzoquat were applied in 20 gpa of water. Barban was applied in 6 gpa of water. There were a few annual broadleaf weeds present, but these were not competitive. The field was flood irrigated. The stand of Jori was very light, apparently due to poor seed quality. Evaluations of wheat growth and vigor were made periodically during the growing season. Harvest was June 13 with a plot combine 4.6 ft. wide the length of each treatment. Each plot was weighed in the field without recleaning.

Herbicides had some effect on early season growth of all varieties. On March 12, difenzoquat severely affected Jori and Crane. Barban gave the most consistent early season stunting and severely injured Produra. By April 18, most treatments had fully recovered except those showing 17% or more stunting at the earlier date.

Yield of Crane wheat was reduced by difenzoquat. Barban reduced the yield of Produra. Jori and Zarogosa which were severely affected early in the season by difenzoquat or barban did not have a significant yield reduction, but did not appear to have made full recovery at harvest. (Plant Sciences Dept., University of Arizona, Tucson, Arizona 85721).

Variety and herbicide treatments % stunt of wheat March 12 and April 18 and harvest weight in calculated yield lb/A June 13. Yuma Valley Experiment Station.

Variety	Type	Treatment	lb/A	% stunt		Calculated Yield
				March 12	April 18	lb/plot
Jori	Durum	Difenzoquat	1.0	72	27	5280 a*
		Barban	.4	7	0	5980 a
		Diclofop	1.5	2	0	5630 a
		Check		0	0	5980 a
Crane	Durum	Difenzoquat	1.0	82	52	5280 b
		Barban	.4	27	2	6690 a
		Diclofop	1.5	10	0	7390 a
		Check		0	0	7040 a
WBP 1000 D	Durum	Difenzoquat	1.0	7	0	7740 a
		Barban	.4	12	0	7740 a
		Diclofop	1.5	10	0	7740 a
		Check		0	0	8100 a
Produra	Durum	Difenzoquat	1.0	17	7	6690 a
		Barban	.4	52	12	5230 b
		Diclofop	1.5	10	0	6690 a
		Check		0	0	6340 a
Tenori	Red	Difenzoquat	1.0	7	0	6340 a
		Barban	.4	12	0	7040 a
		Diclofop	1.5	2	0	7040 a
		Check		0	0	7390 a
Yecora Rojo	Red	Difenzoquat	1.0	2	0	7740 a
		Barban	.4	12	0	7740 a
		Diclofop	1.5	2	0	7740 a
		Check		0	0	8450 a
NK Probred	Red	Difenzoquat	1.0	5	0	7390 a
		Barban	.4	20	2	7040 a
		Diclofop	1.5	9	0	7740 a
		Check		0	0	8100 a
Zaragosa	Red	Difenzoquat	1.0	5	0	7390 a
		Barban	.4	27	10	6340 a
		Diclofop	1.5	5	2	7740 a
		Check		0	0	7390 a

*Means in the same column and within the same variety followed by the same letter are not significantly different at the 5% level of probability.

Comparison of selective herbicides for wild oat control in spring wheat. Lee, G. A., G. A. Mundt, M. E. Coleman-Harrell and W. J. Schumacher. A study was conducted to determine the influence of several postemergence herbicide treatments on the wild oat population when the grassy weeds were in the 4- to 5- leaf stage of growth. At the time of herbicide application, the spring wheat (cultivar Fielder) was in the 3- to 5- leaf stage of growth on June 20, 1978. The air temperature was 55 F, soil temperature was 58 F and the relative humidity was 61 percent. Moisture was nearly depleted in the top 6 inches of the soil profile. Plots were 9 ft. by 30 ft. in size and each treatment was replicated three times in a completely randomized block design. Herbicide treatments were applied with a knapsack sprayer equipped with a three nozzle boom calibrated to deliver 10 gpa total carrier. Difenzoquat was applied in 40 gpa carrier where specially noted in the acompanying table.

Diclofop-methyl, with or without surfactant, did not provide adequate control of wild oats which were in the 4- to 5- leaf stage of growth. Compared to the lower rate of difenzoquat at 1.0 lb/A which provided significantly better control of wild oat population. Difenzoquat + MSMA at .75 + 2.0 lb/A gave significantly better control of wild oats than difenzoquat at .75 lb/A alone. MSMA at 2.0 lb/A and 3.0 lb/A resulted in excellent control of the wild oat population without any apparent influence on the spring wheat crop. FC-9204 + Agro Wetter at 1.0 lb/A and 2.0 lb/A gave excellent wild oat control. There was no apparent advantage of adding Amway surfactant to difenzoquat in terms of wild oat control and the crop yield was slightly suppressed where the surfactant was utilized. Although excellent wild oat control was obtained with several herbicide treatments, no significant increase in crop yield was detectable. This is apparently due to the early competitive influence of the wild oats on the crop which can not be recovered by the late removal of the undesirable weeds. (Idaho Agric. Exp. Sta., Moscow).

Effect of postemergence herbicide treatments on spring wheat and wild oat control at Troy, Idaho

Treatment	Rate lb/A	% Crop Vigor Reduction	% Wild Oat Control	Bu/A	Yield of percent of check
Check	-0-	--	--	17.9	100.0
diclofop-methyl	.63	16.7ac[1/]	36.7cd	15.5	85.3
diclofop-methyl + W.A.[2]	.63	20ab	54.3	17.7	98
diclofop-methyl	.75	3.3cd	45cd	17.7	98.7
diclofop-methyl + W.A.	.75	5bd	33.3cd	19.4	109
diclofop-methyl	1.0	10ad	28.3d	18.5	103
difenzoquat	.75	11.7ad	56.7bd	23.4	130
difenzoquat	1.0	6.7ad	96a	23.7	133
R-40244	.5	3.3cd	28.3d	18.6	102.7
diclofop-methyl + R-40244	1.0 + .5	15ad	70ac	20.5	115
diclofop-methyl + R-40244	1.0 + 1.0	21.7a	59.3ad	20.1	113.3
difenzoquat + R-40244	1.0 + 1.0	18.3ac	99a	24.7	139
R-40244	1.0	18.3ac	63ad	20.9	117.7
GCP-6305	.5	5bd	43.3cd	20.9	117.3
FC-9204 + Agro Wetter	.5 + .5%V/V	10ad	69.7ac	23.7	133.3
FC-9204 + Agro Wetter	1.0 + .5%V/V	8.3ad	92.7ab	24.3	136
FC-9204 + Agro Wetter	2.0 + .5%V/V	15ad	96a	23.4	132
MSMA	2.0	13.3ad	99a	21.7	122.7
MSMA	3.0	15ad	99a	20.6	116
difenzoquat + MSMA	.75 + 2.0	16.7ac	99a	19.3	108
difenzoquat (40 gpa)	1.0	10ad	99a	22.9	129.7
difenzoquat (40 gpa) + Amway Surf. .5%V/V	1.0	0.0d	99a	20	113.3

1/ Means with the same letter(s) within the same column are not significantly different at the .05 level.
2/ W.A. = wetting agent

Evaluation of herbicides for wild oat control in spring wheat. Morishita, D. W., G. A. Lee, W. J. Schumacher, and W. S. Belles. This study was conducted to evaluate herbicides for the control of wild oats in spring wheat (cultivar: Fielder). Research plots were established at the Plant Science Research Farm, Moscow, Idaho, May 16, 1979. A knapsack sprayer calibrated to deliver 20 gpa was used, with the exception of the barban treatments which were applied at 5 gpa. The sprayer was equipped with a three nozzle boom. Soil type was Palouse silt loam. Treatments were replicated three times in a randomized complete block design using 9 by 30 ft plots. On June 19, 1979, four postemergence herbicides were applied at the two-to five-leaf stage of the wild oats. The air temperature was 66 F, relative humidity 72%, and the sky was overcast. Soil temperatures at 4 and 6 inch depths were 78 and 70 F, respectively. On July 9, 1979, two postemergence herbicides were applied when the wild oat plants were in the five-leaf stage of growth. Air temperature was 77 F, relative humidity 60%, and the sky was partially overcast. Soil temperatures at the 4 and 6 inch depths were 82 and 74 F, respectively. Crop injury and weed control were determined visually. Yield data for each treatment were obtained by harvesting a 114.2 sq ft area of each plot. Harvesting was done with a Hege plot combine.

SD-45328 at .4 lb/A was the only herbicide treatment which provided commercially acceptable control. Although SD-45328 at .2 lb/A resulted in only a 72.5% reduction of the wild oat infestation, the control was substantially better than that obtained with barban or difenzoquat. The addition of 2,4-D amine and bromoxynil to SD-45328 adversely affected the herbicides ability to control wild oats. Although no significant differences were detectable in yield of wheat from plots treated with various herbicides, the highest yields were recorded from plots treated with SD-45328 at .4 lb/A and barban at .375 lb/A applied at recommended stages of growth for wild oat control. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Wild oat control in spring wheat resulting from foliar applications of herbicides at Moscow, Idaho

Treatment	Rate lb/A	Crop SR[2]	Crop VR[3]	Wild Oat SR	Wild Oat VR	Bu/A	% Yield by wt. of check
check	-	0b	0a	0c	0a	38a	100a
difenzoquat(3-5)[1]	.75	0b	0a	12.5bc	5a	37a	96a
difenzoquat(3-5)	1.0	7.5ab	2.5a	12.5bc	2.5a	32a	87a
barban(2-3)	.5	0b	2.5a	37.5a-c	7.5a	39a	106a
barban(2-3)/ barban(3-5)	.375/.375	2.5ab	0a	42.5a-c	7.5a	38a	100a
barban(2-3)	.375	0b	0a	30ac	7.5a	42a	112a
barban(3-5)	.375	2.5ab	0a	0c	0a	34a	93a
SD-45328(3-5)	.2	5ab	2.5a	72.5ab	7.5a	35a	94a
SD-45328(3-5)	.4	10a	5a	90a	0a	42a	112a
2,4-D amine + SD-45328(3-5)	.5	7.5ab	2.5a	32.5a-c	2.5a	35a	94a
bromoxynil + SD-45328(3-5)	.5 + .2	7.5ab	2.5a	12.5b-c	2.5a	38a	100a

Means within a column followed by the same letter are not significantly different at the .05 level by Duncan's new multiple range test.

[1] Wild oat leaf stage at time of application.

[2] Stand reduction.

[3] Vigor reduction.

Competition of fiddleneck in wheat Weakley, C.V. and J. E. Hill.

Fiddleneck is a persistent weed in California winter cereal production because it is not effectively controlled by 2,4-D. The most effective but more expensive treatment, bromoxynil, may not be warranted, however, until a threshold level of fiddleneck is reached. A field experiment was established to assess the competitive effect of fiddleneck on wheat and to compare the relative effectiveness of bromoxynil and 2,4-D for fiddleneck control. The experimental design consisted of 1.2 m by 7.3 m plots arranged in a randomized complete block design and replicated four times. On December 15, 1978, the plots were preseeded with fiddleneck to obtain population levels of 0, 24.2, 48.4, 96.9, 193.8, and 387.5 plants/m^2. Anza wheat was drilled in rows spaced 0.15 m apart at a seeding rate of 112 kg/ha. Bromoxynil treatments were applied on January 29, 1979, when the wheat and the fiddleneck were both in the 2 to 3 leaf stage. 2,4-D treatments were applied on March 2, 1979, when the wheat had 3 to 4 tillers and the fiddleneck had 10 to 12 leaves. Both herbicides were applied with a CO_2 pressurized sprayer at 187 l/ha. Irrigation was by rainfall and flooding and the soil was Yolo fine sandy loam.

Fiddleneck population levels were determined by counts made on January 25, 1979. Crop tolerance to the herbicide treatments was evaluated by means of a wheat stand count on February 26, 1979, and by crop vigor ratings on February 28, 1979, and April 13, 1979. Neither herbicide treatment caused a reduction in stand or vigor. Weed control was evaluated by weed control ratings on February 24, 1979, March 29, 1979, and April 25, 1979. Bromoxynil provided excellent control of fiddleneck at all population levels. 2,4-D did not provide adequate fiddleneck control, especially at the high population levels. The plots were harvested for yield and bushel weight determination on July 17, 1979. Competition from fiddleneck reduced wheat yield at all population levels except 24.2 fiddleneck/m^2. The bromoxynil treatments resulted in no yield reduction at any of the population levels. The 2,4-D treatments resulted in no yield reduction at the 24.2 and 48.4 fiddleneck/m^2 levels but significant yield reduction at the three higher population levels. There was no effect on bushel weight from any of the treatments. (U. C. Cooperative Extension, Davis, CA 95616)

Competition of fiddleneck in wheat - summary

425-511-90-60-1-79

Treatment	Rate kg/ha	Fiddleneck/m[2] 1/25/79	Stand[1] 2/26/79	Crop vigor[2] 2/28/79	Crop vigor[2] 4/13/79	Weed control rating[3] 2/24/79	Weed control rating[3] 3/29/79	Weed control rating[3] 4/25/79	Yield[4] (kg/ha)	Bushel[4] Wt. (g)
bromoxynil	0.42	0	44 a	9.3 a	8.4 a	9.1 a	9.0 a	10.0 a	6575 a	0.14 a
bromoxynil	0.42	24.2	40 a	9.8 a	9.4 a	9.0 a	8.8 a	10.0 a	6470 a	0.14 a
bromoxynil	0.42	48.4	40 a	9.5 a	8.9 a	9.5 a	9.3 a	10.0 a	6445 a	0.14 a
bromoxynil	0.42	9.69	44 a	9.8 a	8.0 a	8.6 a	8.8 a	10.0 a	6000 a	0.14 a
bromoxynil	0.42	193.8	41 a	9.0 a	8.8 a	9.4 a	9.1 a	10.0 a	6600 a	0.14 a
bromoxynil	0.42	387.5	39 a	9.3 a	9.0 a	9.0 a	9.0 a	10.0 a	6455 a	0.14 a
2,4-D	0.84	0	-	9.3 a	8.6 a	9.0 a	8.8 a	10.0 a	6155 a	0.14 a
2,4-D	0.84	24.2	-	9.8 a	8.5 a	5.8 bc	6.6 b	7.6 b	5830 a	0.14 a
2,4-D	0.84	48.4	-	9.5 a	8.1 a	5.5 bc	5.0 cd	6.8 b	6035 a	0.14 a
2,4-D	0.84	96.9	-	9.8 a	9.4 a	3.8 d	4.0 de	5.3 c	5695 ab	0.14 a
2,4-D	0.84	193.8	-	9.8 a	8.1 a	2.0 ef	1.5 gf	3.0 d	4745 bc	0.14 a
2,4-D	0.84	387.5	-	9.3 a	8.1 a	0.0 g	0.5 g	1.5 e	3895 cd	0.14 a
control	-	0	36 a	9.5 a	8.6 a	9.0 a	8.5 a	10.0 a	6410 a	0.14 a
control	-	24.2	42 a	9.5 a	8.9 a	7.0 b	6.0 bc	5.3 c	5705 ab	0.14 a
control	-	48.4	42 a	9.5 a	8.4 a	4.5 cd	5.0 cd	2.8 de	4500 cd	0.14 a
control	-	96.9	42 a	10.0 a	8.9 a	3.5 de	2.8 ef	0.5 f	3840 cd	0.14 a
control	-	193.8	46 a	10.0 a	9.0 a	1.0 efg	1.5 fg	0.3 f	3400 d	0.14 a
control	-	387.5	43 a	9.8 a	8.5 a	0.5 fg	0.5 g	0.5 f	2255 e	0.14 a

1 Wheat stand per 1 m of drill row; 2,4-D not applied at time of stand count; numbers are the average of four replications

2 10 = 100% vigor; 0 = death; numbers are the average of four replications

3 10 = 100% weed control; 0 = no weed control; numbers are the average of four replications

4 Numbers are the average of four replications

Means followed by the same letter are not significantly different at the .05 level

Annual broadleaf weed control in winter wheat. Eldredge, E. P., G. A. Lee and G. A. Mundt. A study was established at Tensed, Idaho to evaluate herbicide treatments for annual broadleaf weed control in winter wheat (cultivar Dawes). Herbicide treatments were applied April 10, 1978 using a knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa. Air temperature at the time of application was 56 F, relative humidity was 71% and wind speed was 4 mph. Yield data were obtained using a Hege small plot combine. Area harvested was 114.2 sq. ft.

Treatments were evaluated June 5, 1978 for weed control. Metribuzin + bromoxynil at .375 + .375 lb. ai/A provided good weed control but had a low yield although, crop vigor was not significantly reduced (see table). The only treatment which did not control redstem filaree and henbit was the low rate of 2,4-DP at .5 lb ai/A. Terbutryn + bromoxynil at .8 + .375 lb. ai/A, 2,4-D LV ester at .75 lb. ai/A, and 2,4-D + 2,4-DP at .375 + .375 lb. ai/A provided good control of corn gromwell. (Idaho Agricultural Experiment Station, Moscow, Idaho).

Effect of herbicide treatments following terbutryn + chlorbromuron application to conventional till/conventional drill winter wheat

Treatment	Rate lb ai/A	Percent Crop Vigor Reduction	Percentage Control			Yield bu/A
			Filaree	Henbit	Gromwell	
Untreated check	-	-	-	-	-	86
2,4-D + 2,4-DP	.25 + .25	8ac[1]	100a	100a	43c	98
2,4-D + 2,4-DP	.375 + .375	3bc	100a	100a	73b	112
2,4-DP (amine)	.5	20a	57b	68b	0f	97
2,4-DP (amine)	.75	10ac	100a	100a	23de	112
2,4-D (LVester)	.5	7bc	100a	97a	47c	95
2,4-D (LVester)	.75	10ac	100a	100a	90ab	110
metribuzin + bromoxynil	.375 + .375	0c	100a	100a	95a	89
diuron + bromoxynil	.4 + .375	13ab	100a	100a	13ef	100
terbutryn + bromoxynil	.8 + .375	0c	100a	100a	80ab	98
77-A579	.375	10ac	100a	100a	0f	111
R-40244	1	0c	100a	100a	17cf	92
dicamba + bromoxynil	.0625 + .375	0c	100a	100a	0f	100
dicamba + bromoxynil	.125 + .375	8ac	100a	100a	15ef	88
dicamba + MCPA	.125 + .25	7bc	100a	100a	23de	96
buthidazole	.25	0c	100a	100a	42cd	76

[1]Numbers within a column followed by the same letter are not significantly different at the 5% level.

Annual broadleaf weed control in winter wheat grown under conventional tillage. Eldredge, E. P., G. A. Lee and G. A. Mundt. A study was established April 10, 1978 at Tensed, Idaho to evaluate herbicide treatments for annual broadleaf weed control in conventional tillage winter wheat (cultivar: Dawes). Herbicides were applied to 9 ft. by 30 ft. plots using a knapsack sprayer equipped with a three-nozzle boom calibrated to deliver 40 gpa of water carrier. Each herbicide treatment was replicated 3 times in a randomized complete block design. Air temperature at the time of application was 56 F, relative humidity was 71% and wind speed was 4 mph. In June, the plots were visually evaluated for percentage weed control, and in September yield data were obtained using a Hege small plot combine. Area harvested was 114.2 sq. ft.

Metribuzin + bromoxynil at .375 + .375 ai/A was the only treatment which effectively controlled redstem filaree as well as all other weed species present (see table). Buthidazole at .25 lb ai/A and R-40244 at 1.0 lb ai/A each gave excellent control of all weed species present except redstem filaree and did not significantly reduce crop vigor. (Idaho Agricultural Experiment Station, Moscow, Idaho.)

Effect of herbicide treatments applied to conventional drill-planted winter wheat

Treatment	Rate lb ai/A	Crop Vigor Reduction	Percent Control: Redstem filaree	Percent Control: Henbit	Percent Control: Corn Gromwell	Percent Control: Mustard sp	Yield bu/A
Untreated check	-	-	-	-	-	-	106
R-40244	1	0d[1/]	0d	100a	100a	100a	84
dicamba + bromoxynil	.0625 + .375	15a/d	10d	52b	0d	0e	98
dicamba + bromoxynil	.125 + .375	8b/d	40c	80a	100a	100a	104
dicamba + MCPA	.125 + .25	13a/d	65b	60b	100a	87ab	91
2,4-D amine + 2,4-DP	.25 + .25	7cd	70b	50b	57b	50d	106
2,4-D amine	.5	18a/c	0d	0d	0d	0e	115
2,4-D LV4	.5	23ab	0d	0d	33c	75bc	97
buthidazole	.25	8b/d	70b	100a	100a	100a	84
metribuzin + bromoxynil	.375 + .375	0d	100a	100a	100a	100a	102
77-A579	.375	22a/c	33c	23c	68b	58cd	114

1/ numbers within a column followed by the same letter do not differ significantly at the 5% level.

Control of redstem filaree in no-till winter wheat. Eldredge, E. P., G. A. Lee and G. A. Mundt. A trial was established at Tensed, Idaho April 10, 1978 to evaluate herbicide treatments for redstem filaree control in no-till winter wheat (cultivar: Dawes) planted with a John Deere no-till drill. Herbicide treatments were applied to 9 ft. by 30 ft. plots replicated 3 times in a randomized complete-block design. A knapsack sprayer with a three-nozzle boom calibrated to deliver 40 gpa was used to apply the herbicides. At the time of application air temperature was 56 F, relative humidity was 71% and wind speed was 4 mph. Visual evaluations of percentage weed control were made in June, and yield data was taken in September by harvesting a 119 sq. ft. swath from each plot with a plot combine.

Metribuzin + bromoxynil at .375 + .375 lb ai/A and 2,4-D amine + 2,4-DP at .25 + .25 lb ai/A gave significantly better control of redstem filaree with less crop vigor reduction than any of the other herbicide treatments evaluated. (Idaho Agricultural Experiment Station, Moscow, ID 83843.)

Herbicidal control of redstem filaree in no-till winter wheat

Treatment	Rate ai/A	Percentage: Crop vigor reduction	Percentage: Redstem filaree control	Yield bu/A
untreated check	-	-	-	63
R-40244	1	45	0b[1/]	62
dicamba + bromoxynil	.0625 + .375	65	0b	59
dicamba + bromoxynil	.125 + .375	58	13b	68
dicamba + MCPA	.125 + .25	60	8b	85
2,4-D amine + 2,4-DP	.25 + .25	37	70a	75
2,4-DP	.5	55	8b	60
2,4-D LVester	.5	57	0b	57
buthidazole	.25	43	13b	67
metribuzin + bromoxynil	.375 + .375	18	93a	78
77-A579	.375	43	17b	68

1/ numbers followed by the same letter do not differ significantly at the 5% level.

Redstem filaree control in no-till winter wheat. Eldredge, E. P., G. A. Lee, and G. A. Mundt. A study was established at Tensed, Idaho, to evaluate eleven herbicide treatments for broadleaf weed control in winter wheat (cultivar: Dawes). The treatments were applied to 9 ft. by 30 ft. plots replicated 3 times in a randomized complete-block design. Herbicides were applied April 10, 1978, using a knapsack sprayer with a three-nozzle boom calibrated to deliver 40 gpa of water carrier. At the time of application the air temperature was 56 F, relative humidity was 71%, and wind speed was 4 mph. Redstem filaree was the principal weed in the experimental area with population density of 10 plants per square foot. Metribuzin + bromoxynil at .375 + .375 lb ai/A gave 83% control of redstem filaree and yielded highest with 79 bushels per acre. None of the other treatments gave control of redstem filaree and all caused unacceptable reduction of crop vigor. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Control of redstem filaree with herbicide treatments applied to winter wheat seeded with a Melroe no-till drill

Treatment	Rate lb ai/A	Crop 1/ V.R.	Filaree Control 3/	Yield Bu/A
untreated check	-	-	-	38bc
R-40244	1	52cd 2/	0b	59ab
dicamba + bromoxynil	.0625 + .375	57cd	0b	61ab
dicamba + bromoxynil	.125 + .375	75ab	0b	37bc
dicamba + MCPA	.125 + .25	55cd	0b	48bc
2,4-D + 2,4-DP	.25 + .25	67ac	0b	47bc
2,4-DP	.5	60bd	0b	47bc
2,4-D LV ester	.5	80a	0b	34c
uthidazole	.25	53cd	0b	41bc
metribuzin + bromoxynil	.375 + .375	20e	83a	79a
77-A579	.375	43d	0b	45bc

1/ Percentage crop vigor reduction.
2/ Means within a column with the same letter are not significantly different at the .05 level.
3/ Percentage control of redstem filaree.

Postemergence herbicide treatments for control of broadleaved weeds in winter wheat. Humburg, N. E. and H. P. Alley. Herbicides were applied in the spring to fall-planted winter wheat for evaluation of treatments for controlling spring-germinated broadleaved weeds. Herbicides were broadcast-applied on May 21, 1979 with a knapsack sprayer that delivered 40 gpa of water solution. Ninety percent of the wheat was fully tillered and 8 to 12-in tall when herbicides were applied. Growth of weeds was as follows: erect knotweed, cotyledon to 6-leaf stage and 0.5 to 2-in height; slimleaf lambsquarters, cotyledon to 8-leaf stage and 0.5 to 2-in height. Soil was moist and plants were actively growing. Environmental conditions at the time of herbicide application were: air temperature, 66 F; relative humidity, 44%; partly cloudy; soil temperatures, 103, 88, 76 and 61 F for surface and depths of 1, 2, and 4 inches, respectively. Plots were 9 by 25 ft and arranged in a randomized complete block design with three replications. Soil was sandy loam (61.8% sand, 25.2% silt and 13.0% clay) with pH 5.6 and 1.9% organic matter.

Plots were visually evaluated for weed control on July 18, 1979. None of the herbicide treatments adversely affected the wheat. The predominant weed species were slimleaf lambsquarters and erect knotweed. Other weeds included wild buckwheat, Russian thistle and cutleaf nightshade. Performance of herbicides for control of erect knotweed was more variable than for control of slimleaf lambsquarters. Most treatments provided good or total control of slimleaf lambsquarters with the exception of bifenox at 0.5 lb/A which gave 47% control. Herbicides and herbicide combinations that gave good control of erect knotweed and slimleaf lambsquarters were bromoxynil, bromoxynil + MCPA, DPX-4189, DPX-4189 + metribuzin and bifenox + 2,4-D amine. Bromoxynil + MCPA controlled all broadleaf weeds except some Russian thistle plants. DPX-4189 did not control cutleaf nightshade. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-996).

Postemergence herbicide treatments for control of broadleaved weeds in winter wheat

Herbicides[1]	Rate lb ai/A	Percent weed control[2]	
		erect knotweed	slimleaf lambsquarters
bromoxynil	0.12	70	80
bromoxynil	0.25	93	93
bromoxynil	0.38	93	100
bromoxynil + MCPA	0.25 + 0.25	100	100
DPX-4189	0.03	96	100
DPX-4189	0.06	100	100
DPX-4189 + metribuzin	0.03 + 0.12	100	100
DPX-4189 + metribuzin	0.06 + 0.12	100	100
metribuzin	0.25	70	100
bifenox + 2,4-D amine	0.25 + 0.5	50	100
bifenox + 2,4-D amine	0.5 + 0.5	96	100
bifenox + MCPA	0.25 + 0.5	23	100
bifenox + MCPA	0.5 + 0.5	70	100
bifenox	0.5	17	47
2,4-D amine	0.5	23	100
2,4-D amine	1.0	57	100
MCPA	0.5	50	80
R-40244	0.25	30	100
R-40244	0.5	43	100
R-40244	0.75	66	100
Check	---	0	0
plants/sq ft		*4.5*	*6.7*

[1]Herbicides applied May 21, 1979.
[2]Visual weed control evaluations July 18, 1979.

Evaluation of postemergence herbicides for broadleaf weed control in winter wheat. Schumacher, W. J., G. A. Lee, and W. S. Belles. This study was initiated to evaluate the effectiveness of experimental and registered postemergent herbicides for broadleaf weed control in winter wheat (cultivar Nugaines) at Viola, Idaho on April 27, 1979. The herbicides were applied using a conventional knapsack sprayer equipped with a 3 nozzle boom containing 8004 teejet nozzles calibrated to deliver 40 gpa at 40 psi. Plots were 9 by 30 ft. arranged in a randomized complete block design with 3 replications. The area was a no-till wheat field with heavy stubble. The wheat stage at time of application was in the 4- to 5-tiller stage with secondary roots .75 to 1 in. long. The terrain was a southwest exposure with a 2% slope. Air and soil temperatures at time of application were 72 F and 50 F at 8 inches, respectively; relative humidity was 46%. Crop stand and vigor reduction along with percent Jim Hill mustard, mayweed, prickly lettuce and field pennycress control were taken visually. Yield data were obtained using a small plot Hege combine. The sample area harvested was 114.75 sq. ft.

DPX-4189 at rates from .031 to .125 lb/A gave 100% control of all weed species with no resulting crop injury. DPX-4189 plus metribuzin at all three rates also resulted in 100% weed control with good crop tolerance (see accompanying table). Both 2,4-D (acid) and 2,4-D (amine) resulted in 100% control of field pennycress and Jim Hill mustard, 80% or better control of prickly lettuce, but undesirable control of mayweed. All treatments resulted in higher yields than the untreated check. Highest yields (90 bu/A) were obtained with DPX-4189 at .125 lb/A. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Effects of herbicides for selective broadleaf weed control
in winter wheat at Viola, Idaho

Treatment	Rate lb/A	% crop stand reduction	% Control Jim Hill mustard	may-weed	prickly lettuce	field pennycress	bu/a	% yield by wt. of check
check	0	0d[1]	0b	0d	0b	0b	73d	100
DPX-4189	.031	0d	100a	100a	100a	100a	87abc	119
DPX-4189	.063	0d	100a	100a	100a	100a	90ab	123
DPX-4189	.125	0d	100a	100a	100a	100a	90a	123
DPX-4189 + metribuzin	.031 + .375	13b	100a	100a	100a	100a	76cd	104
DPX-4189 + metribuzin	.063 + .375	13b	100a	100a	100a	100a	77bcd	106
DPX-4189 + metribuzin	.125 + .375	13b	100a	100a	100a	100a	84a-d	115
metribuzin	.375	22a	100a	87ab	70a	100a	78bcd	106
2,4-D (acid)	.5	0d	100a	37c	80a	100a	84a-d	115
2,4-D (acid)	.75	8bc	100a	57bc	83a	100a	88abc	119
2,4-D (amine)	.5	3cd	100a	33c	80a	100a	83a-d	113
2,4-D (amine)	.75	10bc	100a	43c	100a	100a	84a-d	115

[1]Means followed by the same letter(s) in the same column are not significantly different at the .05 level.

Evaluation of herbicides for broadleaf weed control in winter wheat. Schumacher, W. J., G. A. Lee and W. S. Belles. This study was initiated May 11, 1979 at Potlatch, Idaho, on a Palouse silt loam soil to evaluate the effectiveness of herbicides alone and in tank mixes for broad spectrum broadleaf weed control in winter wheat (cultivar Hyslop). All treatments were applied with a conventional knapsack sprayer when the crop was in the 6 leaf and 5 tiller stage of growth and weeds ranged in size from 2 to 6 inches in height. The sprayer was equipped with a 3 nozzle boom containing 8004 teejet nozzles calibrated to deliver 40 gpa at 40 psi. Plots were 9 by 30 ft. arranged in a randomized complete block design with three replications. Air temperature was 59 F and soil temperature at 4 inches was 64 F. Relative humidity was 62%. The test area had a 12% south exposure with high soil moisture. Crop stand and vigor reduction along with broadleaf weed stand and vigor reduction were taken visually. Yield data from 15 ft. of row were obtained by hand harvesting and threshing with a Vogel thresher.

Plots treated with DPX-4189 at rates of 0.62 and .125 lb/A gave excellent broad spectrum weed control with the exception of lambsquarter control at the lower rate (see accompanying table). Both rates caused no crop injury. When metribuzin was added as a tank mix to DPX-4189, there was no noticeable crop injury but 73% or better broadleaf weed control was obtained. The comparison of plots treated with 2,4-D (acid) and 2,4-D (amine) at a rate of .5 lb/A showed 2,4-D (acid) obtaining better weed control of all species with the exception of mayweed and pineapple weed, with no significant difference in crop injury. Metribuzin tank mixed with bromoxynil gave 78% or better broadleaf weed control as compared to metribuzin alone which gave only 30-40% control on some species. Although no significant yield differences were obtained among the treated plots, all yielded better than the check. Plots treated with metribuzin + bromoxynil yielded better than those treated with metribuzin alone. The 2,4-D (acid)-treated plots yielded better than plots treated with 2,4-D (amine), both at rates of .5 lb/A. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Effect of registered and candidate herbicides for broadleaf weed control in winter wheat at Potlatch, Idaho

Treatment	Rate lb/A	% Crop stand reduction	% Control: Shepherds-purse	% Control: May-weed	% Control: Pineapple weed	% Control: Lambs-quarter	bu/A	% Yield by wt. of check
DPX-4189	.062	0a[1]	100a	92ab	100a	38abc	63ab	200
DPX-4189	.125	0a	100a	100a	100a	93ab	65ab	200
DPX-4189 + metribuzin	.062 + .375	10a	87ab	73abc	98a	93ab	69ab	224
DPX-4189 + metribuzin	.062 + .25	8a	100a	100a	100a	87ab	59abc	185
R-40244	.5	13a	100a	62abc	82ab	97ab	76ab	228
R-40244	.75	5a	73ab	83abc	63b	67ab	74ab	171
2,4-D (acid)	.5	3a	95a	52bc	72ab	48abc	78a	244
2,4-D (amine)	.5	5a	70ab	77abc	93ab	33bc	64ab	180
2,4-D (acid)	.75	8a	72ab	72abc	90ab	65ab	73ab	222
metribuzin	.375	10a	35bc	43c	95ab	97ab	55abc	166
metribuzin	.25	13a	67ab	68abc	97a	97ab	67ab	211
metribuzin + bromoxynil	.375 + .375	2a	100a	78abc	97a	97ab	70ab	223
terbutryn + bromoxynil	.5 + .5	10a	100a	100a	97a	100a	52bc	141
check	0	0a	0c	0d	0c	0c	36c	100

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

Influence of a liquid fertilizer carrier on the activity of difenzoquat and diclofop-methyl for wild oat control. Lee, G. A., G. A. Mundt and W. J. Schumacher. The study was conducted to determine the influence of a liquid nitrogen fertilizer carrier on difenzoquat activity for wild oat control. An aqueous solution of 32 percent nitrogen (Sol 32) was diluted with water to get the proper concentration for application rates of 10, 20, and 40 gpa total carrier and 25 or 40 lb of N per acre. Difenzoquat was applied with water only and equal amounts of granular formulated nitrogen was applied over the treated area to assimilate the fertilizer rates. The study was initiated on June 20, 1978, when the wild oats were in the 4- to 5- leaf stage of growth. The air temperature was 74 F, soil temperature was 68 F at depth of 4 inches, and the relative humidity was 45 percent. Moisture was low in the top 4 inches of the soil profile. Each plot was replicated three times in a completely randomized block design. Weed control was determined by clipping the wild oat biomass in two areas of each plot and comparing the weight to the weight in the nontreated check plots. Size of the quadrants used were 5 ft. by 6 inches.

Results indicate that no excessive crop phytotoxicity was attributable to the combinations of difenzoquat and Solution 32. There may have been more initial leaf burning of the crop where high rates of difenzoquat was applied in the low volume, with concentrated levels of nitrogen fertilizer. The best wild oat control was obtained with difenzoquat at 2.0 lb/A applied at 20 gpa and 40 gpa volume of fertilizer necessary to provide 40 lb of N per acre. Several treatments containing difenzoquat at 1.0 lb/A suppressed the wild oat plants so that little or no seed was produced. The wheat yield response was related to both the nitrogen level and wild oat control (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Influence of a liquid fertilizer carrier on the activity of difenzoquat for wild oat control

Treatment	Application Rate/A	Rate lb/A	% Crop Vigor Reduction	% Wild Oat Control	Bu/A	% Yield by weight of check
check	-0-	-0-	-	-	13.6be	-
check + granular N	-0-	40	0	0	11.2ce	82de
difenzoquat + gran. N	10	.75 + 25	7	36ce 1/	12.5ce	92ce
difenzoquat + gran. N	20	.75 + 25	3	47bd	13.5be	99be
difenzoquat + gran. N	40	.75 + 25	7	40cd	11.1de	82e
difenzoquat + gran. N	10	1.0 + 25	3	30de	13.2be	97ce
difenzoquat + gran. N	20	1.0 + 25	2	52ad	14.3be	105be
difenzoquat + gran. N	40	1.0 + 25	3	45bd	13.6be	100be
difenzoquat + gran. N	10	2.0 + 25	7	63ad	15.3be	113be
difenzoquat + gran. N	20	2.0 + 25	3	57ad	17.7ad	130ad
difenzoquat + gran. N	40	2.0 + 25	7	60ad	14.2be	105be
difenzoquat + Sol 32	10	.75 + 25	4	28de	10.5e	77e
difenzoquat + Sol 32	20	.75 + 25	0	48bd	11.7ce	86ce
difenzoquat + Sol 32	40	.75 + 25	3	32de	12.0ce	88ce
difenzoquat + Sol 32	10	1.0 + 25	10	32de	10.2e	75e
difenzoquat + Sol 32	20	1.0 + 25	13	62ad	13.0be	96ce
difenzoquat + Sol 32	40	1.0 + 25	8	55ad	14.3be	105be
difenzoquat + Sol 32	10	2.0 + 25	13	60ad	13.7be	101be
difenzoquat + Sol 32	20	2.0 + 25	8	72ac	14.9be	109be
difenzoquat + Sol 32	40	2.0 + 25	7	72ac	16.7ae	122ae
difenzoquat + Sol 32	10	1.0 + 40	2	32de	13.0be	95ce
difenzoquat + Sol 32	20	1.0 + 40	5	52ad	14.5be	107be
difenzoquat + Sol 32	40	1.0 + 40	3	65ad	14.9be	110be
difenzoquat + Sol 32	20	2.0 + 40	0	88a	16.4ae	121ae
difenzoquat + Sol 32	40	2.0 + 40	5	88a	18.1ac	133ac
diclofop-methyl + granular N	20	1.0 + 25	0	80ab	19.7ab	145ab
diclofop-methyl + Sol 32	20	1.0 + 25	0	58ad	21.9a	161a

1/ Means in the same column followed by the same letter are not significantly different at the .05 level.

Evaluation of postemergence herbicides for broadleaf and wild oat control in winter wheat. Schumacher, W. J., G. A. Lee, and W. S. Belles. This experimental trial was initiated at Southwick, Idaho to evaluate the effectiveness of postemergence herbicides for broadleaf and wild oat control in winter wheat (cultivar Hyslop). All herbicides were applied with a conventional knapsack sprayer equipped with a 3 nozzle boom containing either 8004 teejet nozzles to deliver 40 gpa or 80067 teejet nozzles to deliver 5 gpa at 40 psi. All treatments were applied on May 11, 1979 when the crop was in the 5 leaf, 3 tiller stage and wild oats were in the 3 leaf stage with the exception of difenzoquat which was applied on May 22, 1979 when the crop and wild oats were in the 5 leaf, 4 tiller and 5 leaf stage respectively. Plot size was 9 by 30 ft arranged in a randomized complete block design with 3 replications. The air and soil temperature at 4 in. on May 11 and May 22 were 49 F and 51 F, and 77 F and 70 F respectively. Crop stand and vigor reduction along with weed stand and vigor reduction were taken visually. Yield data was obtained using a Hege small plot combine . The area harvested was 114.75 sq ft.

All treatments gave 82% or better control of mayweed and shepherdspurse with the exception of difenzoquat, diclofop-methyl, and barban which resulted in 0% control of mayweed and 70%, 0%, and 23% control of shepherdspurse respectively. Terbutryn, terbutryn + chlorbromuron, and diclofop-methyl resulted in 100% control of wild oats with metribuzin giving 80% control. Remaining herbicides resulted in undesirable wild oat control. Terbutryn alone and in combination with other herbicides gave 100% control of Miner's lettuce; difenzoquat, diclofop-methyl, and barban resulted in 0% control. (See accompanying table). Although no significant differences were detectable in yield production plots treated with terbutryn + MCPA and diclofop-methyl obtained the highest yields of 80 bu/A. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Effects of herbicides on wild oat and broadleaf weed control in winter wheat at Southwick, Idaho

Treatment	Rate lb/A	% Crop Stand Reduction	% Control Mayweed	Shepherds-purse	Wild oat	Miner's Lettuce	bu/A	% yield by wt. of check
check	0	0a[1]	0c	0c	0d	0b	72a	100
terbutryn	1.6	3a	100a	100a	100a	100a	72a	100
terbutryn + chlorbromuron	.75 + .75	2a	100a	100a	100a	100a	72a	100
diuron + 2,4-D	.5 + .5	0a	97a	100a	0d	83a	78a	101
diuron + bromoxynil	.5 + .125	2a	100a	100a	28bc	100a	75a	104
terbutryn + MCPA	.5 + .5	0a	100a	100a	17cd	100a	80a	112
linuron	.75	0a	97a	100a	47b	70a	76a	106
diuron	1.6	0a	82b	100a	0d	27b	74a	102
metribuzin	1.0	2a	100a	100a	88a	100a	75a	105
difenzoquat	1.0	2a	0c	70b	10cd	0b	76a	106
diclofop-methyl	1.0	0a	0c	0c	100a	0b	80a	112
barban	.5	0a	0c	23c	8cd	0b	79a	110

[1] Means followed by the same letter(s) in the same column are not significantly different at the .05 level.

Comparison of postemergence herbicides for wild oat control in winter wheat. Schumacher, W. J., G. A. Lee, W. S. Belles. This study was initiated in Greencreek, Idaho to evaluate the effectiveness of postemergence herbicides for wild oat control in winter wheat (cultivar Nugaines and Hyslop mix). All treatments were applied on May 14, 1979 when the wild oat plants were in four-leaf stage of growth with the exception of MSMA which was applied on May 23, 1979 when the wild oat plants were in the five-leaf stage. Herbicides were applied with a conventional knapsack sprayer equipped with a three nozzle boom containing 8004 teejet nozzles calibrated to deliver 40 gpa at 40 psi and operated at 3 mph ground speed. Plot size was 9 ft. by 20 ft. and arranged in a randomized complete block design with 3 replications. Crop stage of growth on May 14 and May 23 was six leaf-four tiller and six leaf-five tiller, respectively. Air and soil temperature at 5 inches on May 14 and May 23 was 56 F and 51 F, and 58 F and 55 F, respectively. Relative humidity was 81% on both days. Rain occurred 11 hours after application of MSMA. Wild oat population ranged from 50 plants/sq. ft. to 150 plants/sq. ft. Crop and wild oat stand and vigor reduction were obtained visually. Yied data were obtained using a Hege small plot combine. Area harvested was 69.75 sq. ft.

HOE-23408 plus at both rates and diclofop-methyl at 1.0 lb/A resulted in 90% or better control of wild oats with 70% or better vigor reduction of surviving plants (accompanying table). Diclofop-methyl at .75 lb/A and SD-45328 at .4 lb/A gave 80% or better control of wild oats. There was no significant difference in crop stand or vigor reduction resulting from any of the treatments. All treatments yielded higher then the check with the plot treated with diclofop-methyl at .75 lb/A yielding 43% better then the check based on a per replicate basis. It was also noted that diclofop-methyl caused chlorosis of the wild oat plants 9 days after application, which was not readily noted for any of the other herbicides. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843).

Effect of herbicides for selective control of wild oats in winter wheat at Greencreek, Idaho

Treatment	Rate lb/Acre	Crop SR[1]	Crop VR[2]	Wild oat SR	Wild oat VR	bu/A	% yield by weight of check
check	--	0a	0a	0d	0d	48a	100c
difenzoquat	.75	0a	0a	72ab	33bc	57a	124abc
difenzoquat	1.0	0a	0a	77a	67ab	59a	130ab
diclofop-methyl	.75	0a	0a	83a	57ab	56a	143a
diclofop-methyl	1.0	3a	3a	90a	75a	51a	109bc
HOE-23408+	.63	7a	4a	93a	70ab	53a	113bc
HOE-23408+	.75	0a	5a	92a	82a	49a	109bc
SD-45328	.2	0a	0a	45c	43b	57a	125abc
SD-45328	.4	0a	0a	80a	72ab	55a	123abc
MSMA	1.5	0a	0a	50bc	33bc	50a	109bc
MSMA	2.0	7a	0a	75ab	53ab	51a	113bc
MSMA	3.0	0a	3a	67abc	47ab	50a	112bc

Means with the same letter are not significantly different.

[1] SR = stand reduction

[2] VR = vigor reduction

Evaluation of herbicides for wild oat control in winter wheat. Collins, C. K. and R. L. Collins. Diclofop 3 EC at 0.75 lb ai/A; diclofop 3 EC + urea ammonium nitrate 32% liquid fertilizer (UN 32) at 0.75 lb ai/A + 100 lb Nitrogen/A; difenzoquat 2 E at 1.0 lb ai/A; difenzoquat 2 E + UN 32 fertilizer at 1.0 lb ai/A + 100 lb N/A; metribuzin 50 WP at 0.5, 0.75, and 1.0 lbs ai/A; metribuzin 50 WP + UN 32 fertilizer at 0.75 lb ai/A + 100 lb N/A, were evaluated for wild oat control in winter wheat near Banks, Oregon.

All herbicides were applied April 5, 1979 as a post emergence broadcast spray to Stevens variety non-irrigated winter wheat planted October 15, 1978. The wheat was 9 to 10 inches tall with 4 to 5 tillers. The wild oats averaged 4.1 plants per sq ft, were 4 inches tall, and had 3 leaves at application time. Plot size was 1 sq rod (13 ft by 21 ft) replicated four times in a randomized block design experiment. The herbicides were applied with a CO_2 back pack sprayer using 40 gpa water. The slightly acid silt loam soil was moist on the surface at application. The entire plot area was treated with diuron herbicide at 1.6 lb ai/A on November 15, 1978 and with 140 lb nitrogen/A as urea fertilizer on March 20, 1979. All plots not treated with UN 32 liquid fertilizer on April 5, 1979, received an application of urea fertilizer at 100 lb nitrogen/A. The plot area received 4.26 inches of rain between treatments and harvest, which was August 8, 1979. The plots were harvested with a Hege plot combine with a 4.8 ft wide by 21 ft long swath.

All herbicides gave acceptable wild oat control, but metribuzin caused unacceptable injury to wheat at 0.75 and 1.0 lb ai/A. The addition of UN 32 liquid urea ammonium nitrate fertilizer to each of the herbicides did not appear to cause any increased phytotoxicity to the wheat, and may have increased yields slightly. (Consultants, Rt. 2, Box 81 C, Hillsboro, Oregon, 97123).

Wild oat control in winter wheat, Banks, Oregon

Treatment	Rate lb ai/A	Wild oat 1/ control 7/23/79	Crop injury 1/ 4/31/79	Crop injury 1/ 7/23/78	Yield bu/A
diclofop 3 EC	0.75	9.7	0	0	102.0
difenzoquat 2 E	1.00	9.7	1.6	0	99.8
diclofop 3 EC+UN-32 fert.	0.75+100	9.8	0.1	0	110.6
difenzoquat 2 E+UN-32 fert.	1.00+100	9.5	0.2	0	118.3
metribuzin 50 WP	0.50	8.9	1.0	0	100.8
metribuzin 50 WP	0.75	9.4	6.4	3.75	65.7
metribuzin 50 WP	1.00	9.6	7.6	6.50	39.6
metribuzin 50 WP+UN-32 fert.	0.75+100	9.5	0.3	0.50	92.6
check	0.00	0	0	0	66.1

1/ Visual ratings of foliar damage were 0 = no effect 10 = complete kill.

Selective weed control in winter wheat with DPX 4189. Rydrych, D. J. Preliminary tests in 1979 were conducted at 9 locations in eastern Oregon for the purpose of evaluating DPX 4189 for the selective control of weeds in winter wheat.

Treatments were applied preplant incorporated, preemergence, and postemergence when the majority of winter wheat was in the 3 to 5 leaf stage or tillered. Treatment rates were evaluated at .25, .12, and .06 lb/A in a volume of 20 gpa.

The weed population averaged 50 percent downy brome and 50 percent mixed broadleaf weeds such as blue mustard, Jim Hill mustard, Russian thistle, prostrate knotweed, fiddleneck tarweed, and field pennycress.

Wheat tolerance and weed control evaluations were made in May, 1979, using visual evaluations. Winter wheat yields were recorded at each location.

DPX 4189 was highly effective on downy brome when applied preplant incorporated or preemergence, but it was not effective postemergence. Broadleaf control was less than 30 percent preplant incorporated but was above 80 percent when applied preemergence or postemergence. Prostrate knotweed control was erratic regardless of application method.

Wheat tolerance was marginal at .12 and .25 lb/A in the preemergence tests but was excellent postemergence. More tests are planned in 1980 based on the excellent downy brome control (preplant incorporated) and broadleaf control (postemergence). (Columbia Basin Agricultural Research Center, Pendleton Station, P. O. Box 370, Pendleton, OR 97801)

Selective downy brome control in winter wheat. Rydrych, D. J. Downy brome is a serious weed competitor in the dryland winter wheat and winter barley areas of eastern Oregon particularly where reduced tillage or trashy fallow systems are used. Chemical screening tests in 1972 at the Pendleton Experiment Station showed that metribuzin was the most effective postemergence herbicide tested. Tests conducted since 1972 using metribuzin as a standard have shown that diclofop methyl is highly effective on downy brome when applied as a preplant incorporated treatment.

Downy brome control using diclofop methyl has averaged 90 percent at rates of 1.5 lb/A. Broadleaf control has been poor. Diclofop methyl is incorporated twice using a flextined harrow at depths of 3 inches or less. Tests in 1978 and 1979 showed that diclofop methyl gave 85 to 95 percent control of downy brome with excellent safety to winter wheat. Broadleaf weeds have to be controlled with other herbicides for broad spectrum weed control.

Results at the Pendleton, Sherman, and Umatilla Stations have shown that maximum yield is possible by the use of diclofop methyl for downy brome control. (Columbia Basin Agricultural Research Center, Pendleton Station, P.O. Box 370, Pendleton, OR 97801)

Effect of herbicides applied preemergence surface for control of ripgut brome in winter wheat. Lee, G. A., G. A. Mundt, T. M. Cheney, and W. J. Schumacher. A study was established at Waha, Idaho, to determine the potential of candidate and registered herbicides for ripgut brome control in winter wheat (variety Peck). R-40244 and cycloate were applied preemergence surface on November 17, 1977. Cycloate formulations were cycloate (F) #0009033 and cycloate (5G), applied with linseed oil. A knapsack sprayer equipped with a three nozzle boom applied with herbicides in a total volume of 40 gpa. Flat fan 8004 TeeJet stainless steel nozzles, 40 psi boom pressure and 3 mph ground speed were used to attain delivery rate. A granular spreader and 3 mph ground speed were used to attain delivery rate with the granular herbicides. Each plot was 9 ft. by 20 ft. and replicated three times in a randomized complete block design. Late fall precipitation preceded the application of herbicides with light snow falling during the time of application. Sky conditions were overcast with a 4 mph wind prevailing. Air temperature and relative humidity were 33 F and 79% respectively. Soil temperature at 4 inches was 36 F. Visual observations were taken the 8th of June, 1978. Evaluations were taken comparing percent crop vigor reduction and percent ripgut brome control in the treated plots. Harvest data were obtained using a Hege small plot combine, sampling an area of 90 sq. ft.

Adequate ripgut brome control was obtained with R-40244 at .75 lb ai/A while R-40244 at .50 lb ai/A provided slighlty less control. R-40244 at both rates did not significantly reduce crop vigor. Cycloate (5G) in combination with linseed oil at 3.0 lb ai/A gave slight control of ripgut brome but greatly reduced crop vigor. Cycloate (5G) at 2.0 lb ai/A did not control ripgut brome and the crop showed definite susceptibility while the same chemical at 3.0 lb ai/A showed the greatest level of crop vigor reduction. (Idaho Agricultural Experiment Station, Moscow, Idaho.)

Preemergence herbicides for ripgut brome control in winter wheat at Waha, Idaho

Treatment	Rate	% Crop vigor reduction	% Ripgut brome control	Yield Bu/A
check	-	-	-	22ab
R-40244	.25	10cd[1/]	57ab	28a
R-40244	.50	13cd	72a	25ab
R-40244	.75	20c	77a	24ab
R-40244	1.0	0d	70a	25ab
cycloate (F) #0009033	2.0	10cd	33bc	26a
cycloate (F) #0009033	3.0	12cd	20c	24ab
cycloate (5G) linseed oil	2.0	40b	0c	17bc
cycloate (5G) linseed oil	3.0	60a	6.6c	12c

1/ Means followed by the same letter are not significantly different at the .05 level.

Italian ryegrass and downy brome control in winter wheat. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. A trial was conducted to evaluate several herbicide treatments for downy brome and Italian ryegrass control in winter wheat. The trial was designed as a randomized complete block with three replications. Plots were 2.5 by 8 m. Weeds were planted in 2.5-cm wide strips across each plot prior to planting 'Stephens' winter wheat on October 16, 1978.

Postplant incorporated treatments were applied on October 16, preemergence on October 18, early postemergence on November 13, and postemergence on February 14.

Only DPX 4432 at 0.56 kg/ha and RH 8817/diclofop at 0.5/0.8 kg/ha controlled more than 60% of the downy brome. All treatments were effective on Italian ryegrass. DPX 4189 was more effective on Italian ryegrass when applied early postemergence rather than postemergence, but the better control did not result in higher wheat grain yield. Diclofop-DPX 4189 tankmix combinations increased control of Italian ryegrass in both timings and downy brome early postemergence. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Downy brome and Italian ryegrass control in winter wheat

Treatment	Rate (kg/ha)	Downy brome (% control)	Italian ryegrass (% control)	Wheat grain yield (kg/ha)
Postplant incorporated				
triallate	1.4	0	88	9430
trifluralin	0.8	0	90	9341
Preemergence				
DPX 4432	0.28	40	98	9715
DPX 4432	0.42	57	100	8756
DPX 4432	0.56	83	100	8456
Preemergence/early postemergence				
RH 8817/diclofop	0.2/0.8	37	100	9276
RH 8817/diclofop	0.5/0.8	62	100	9121
diuron/diclofop	0.9/0.8	17	100	9593
diuron/diclofop	1.8/0.8	47	100	9569
Early postemergence				
DPX 4189	0.035	7	92	8821
DPX 4189	0.07	0	98	8382
DPX 4189	0.14	7	100	8350
DPX 4189 + diclofop	0.035 + 0.8	33	100	9089
DPX 4189 + diclofop	0.07 + 0.8	47	100	9081
diuron + diclofop	0.45 + 0.8	0	100	8975
diuron + diclofop	1.35 + 0.8	10	100	8870
Postemergence				
DPX 4189	0.035	0	83	8439
DPX 4189	0.07	0	75	7887
DPX 4189	0.14	23	92	9016
DPX 4189 + diclofop	0.035 + 0.8	0	98	8212
DPX 4189 + diclofop	0.07 + 0.8	0	98	8456
DPX 4189 + diclofop	0.14 + 0.8	13	100	8382
Untreated control	0	0	0	7887
			$LSD_{.05}$	655
			$LSD_{.01}$	871

Ripgut brome control in winter wheat. Mundt, G. A., G. A. Lee and W. J. Schumacher. A study was initiated south of Lewiston, Idaho, to evaluate the potential of several candidate herbicides for control of ripgut brome in winter wheat (variety Peck). The seeding date and rate for the crop was October 21, 1977, and 90 lb/A, respectively. Cycloate and vernolate formulations were applied preemergence surface on October 26, 1977. Metribuzin and terbutryn were applied postemergence at the 3- to 5-leaf stage of the crop and brome. Diclofop-methyl, GCP-6305, R-40244 and triallate were applied preplant incorporated on October 19, 1977. Herbicides were applied with a knapsack sprayer calibrated to deliver 40 gpa. Incorporation of the preplant herbicides was done with a disc to provide adequate mixing of the herbicide and soil to a depth of 2 inches. The speed of the incorporation tool was 5 mph. The soil surface at the time of the incorporation had clods 2 to 4 inches in size. Soil analysis of the study site is, CEC 37.5, % sand 23.6, % silt 50.4 and % clay 26. Treatments were replicated three times in a randomized complete block design.

Percent crop vigor reduction and ripgut brome control was determined by visual evaluation on June 9, 1978. Yield data were obtained using a Hege small plot combine. The sample area harvested was 114.2 sq. ft.

Heavy hail damage to the experimental area occurred July 28, 1978. Thirty-five percent of the crop was lost which resulted in lower yields in all the herbicide treatments.

Diclofop-methyl + R-40244 resulted in the highest yield and excellent ripgut brome control. Crop tolerance with metribuzin and terbutryn was a major problem with these applications. (Idaho Agricultural Experiment Station, Moscow, Idaho).

Effect of herbicide treatments on winter wheat percent stand and yield and ripgut brome control at Lewiston, Idaho

Treatment	Rate lb ai/A	Percent crop vigor reduction	Ripgut brome control	Yield bu/A	Percent yield increase
check	0	0	0	35ac	0
diclofop-methyl	1.0	3c[3]	95a	36ac	3
diclofop-methyl	2.0	0c	93a	40ab	14
diclofop-methyl + R-40244	1.0 + .25	3c	96a	41ab	17
diclofop-methyl + R-40244	1.0 + .5	0c	76ab	42a	20
diclofop-methyl + R-40244	1.0 +.75	13bc	66ac	36ac	3
diclofop-methyl + R-40244	1.0 + 1.0	3c	87ab	43a	23
R-40244	.5	17bc	43bd	37ac	6
cycloate (10 G)[1]	2.0	10c	25cd	41ab	17
cycloate (10 G)	3.0	25bc	23cd	36ac	3
cycloate (10 G) slow release	2.0	7c	20cd	38ac	9
cycloate (10 G) slow release	3.0	23ac	42bc	31bc	-11
cycloate (F)[2]	2.0	8c	87ab	34ac	- 3
cycloate (F)	3.0	13bc	7d	38ac	9
vernolate (10 G)	2.0	23bc	40bd	37ac	6
vernolate (10 G)	3.0	17bc	27cd	34ac	- 3
GCP-6305	.5	7c	57ac	37ac	6
GCP-6305	1.0	3c	0d	40ab	14
diclofop-methyl + metribuzin	.5 + .25	33ac	96a	35ac	0
diclofop-methyl + metribuzin	.75 + .25	33ac	99a	29cd	-17
diclofop-methyl + terbutryn	.5 + .8	17bc	63ac	35ac	0
diclofop-methyl + terbutryn	.75 + .8	10c	76ab	40ab	14
metribuzin + terbutryn	.25 + .8	45ab	99a	21d	-40
metribuzin + terbutryn	.375 + .8	60a	89ab	5e	-86
triallate	1.25	0c	67ac	39ac	11

1 10 percent granular formulation.
2 Flowable formulation.
3 Means followed by the same letter are not significantly different at the .05 level.

Evaluation of diclofop-methyl for ripgut brome control in winter wheat. Schumacher, W. J., G. A. Lee and W. S. Belles. The study was established to determine the effectiveness of preplant incorporated diclofop-methyl for ripgut brome control in winter wheat (cultivar Hyslop). The trial was initiated October 31, 1978 near Lewiston, Idaho. The herbicide was applied using a conventional knapsack sprayer equipped with a 3 nozzle boom containing 8004 teejet nozzles and calibrated to deliver 40 gpa at 40 psi. Plots were 9 ft. by 15 ft. and arranged in a randomized complete block design with 3 replications. Air and soil temperature at 6 inches was 40 F and 47 F, respectively. Relative humidity was 44%. The field had clods ranging from 1 to 4 inches in diameter with heavy trash cover. The herbicide treatments were incorporated twice over at right angles with a disk to a depth of 2 inches, operation speed was 5 mph. Seeding date was November 2, 1978. Crop stand and vigor reduction along with ripgut brome stand and vigor reduction were determined visually. Yield data was obtained using a Hege small plot combine on August 2, 1979. The sample area harvested was 51.75 sq. ft.

Althouth no significant differences were detectable, diclofop-methyl at 1.25 lb/A to 2.0 lb/A resulted in 92% or greater control of ripgut brome. Diclofop-methyl applied at .75 lb/A gave 65% control of brome and applied at 1.0 lb/A gave 78% control. All of the treatments showed good crop tolerance even at the highest rate (see accompanying table). There was no significant difference in yields from plots treated with diclofop-methyl at a rate of 1.5 lb/A yielding 41 bu/A (lowest) and at a rate of .75 lb/A yielding 45 bu/A (highest). The untreated check yielded only 28 bu/A. (Idaho Agricultural Experiment Station, Moscow, Idaho, 83843.)

Effect of diclofop-methyl for selective ripgut brome control
in winter wheat at Lewiston, Idaho

Treatment	Rate lb/A	Crop SR[1]	Crop VR[2]	Ripgut brome SR	Ripgut brome VR	bu/A	% yield by weight of check
Check	0	0b	0c	0d	0c	28a	100b
diclofop-methyl	.75	0b	1.6bc	65c	13bc	47a	176a
diclofop-methyl	1.0	0b	0c	78b	26b	45a	169a
diclofop-methyl	1.25	5.0ab	3.3a-c	92a	50a	44a	168a
diclofop-methyl	1.50	5.0ab	5ab	94a	30b	41a	160a
diclofop-methyl	2.0	12.0a	6.7a	97a	57a	45a	174a

Means followed by the same letter are not significantly different to the .05 level.

[1] SR = % stand reduction

[2] VR = % vigor reduction

Evaluation of preplant incorporated and preemergence surface herbicides for ripgut brome control in winter wheat. Schumacher, W. J., G. A. Lee and W. S. Belles. Plots were established at Waha, Idaho to evaluate the effectiveness of preplant incorporated and preemergence surface herbicides for ripgut brome control in winter wheat (cultivar Hyslop). Herbicides were applied with a conventional knapsack sprayer equipped with a 3 nozzle boom containing 8004 teejet nozzles and calibrated to spray 40 gpa at 40 psi. Plots were 9 ft. by 30 ft. and arranged in a randomized complete block design with 3 replications. Diclofop-methyl, trifluralin, dinitramine and diclofop-methyl + SN-533 were applied preplant incorporated on October 31, 1978. Diclofop-methyl, diclofop-methyl + R-40244, and propachlor were applied preemergence surface on November 13, 1978. The crop was seeding on November 2, 1978. Air and soil temperature at 6 inches were 40 F and 45 F, respectively on October 31. On November 13, air temperature and soil temperature at 6 inches were 22 F and 33 F, respectively. Preplant treatments were incorporated to a depth of 2 inches with a disc. Operation speed was at 5 mph. The implement was pulled twice over the area at right angles. Crop stand and vigor reduction along with ripgut brome stand and vigor reduction were determined visually. Yield data was obtained on August 2, 1979 with a Hege small plot combine. The sample area harvested was 119.2 sq. ft.

Diclofop-methyl at 2.5 lb/A as a preplant incorporated treatment gave 99% control of ripgut brome with good crop tolerance (accompanying table). There was no detectable significant difference in brome control with diclofop-methyl applied preplant incorporated or preemergence surface with the exception of diclofop-methyl at 1.0 lb/A applied preemergence surface. All treatments had good crop tolerance.

Propachlor resulted in inadequate ripgut brome control but had good crop tolerance even at the highest rate. Diclofop-methyl applied at .75 lb/A preplant incorporated gave identical ripgut brome control as diclofop-methyl applied at 1.25 lb/A preemergence surface. Dinitramine gave better weed control then trifluralin but yields were suppressed in plots treated with both herbicides. Diclofop-methyl + SN-533 resulted in lower ripgut brome control than diclofop-methyl alone, but in combination with R-40244, the brome control was better than the 1.0 lb ai/A rate of diclofop-methyl both as preplant incorporated and preemergence applications.

There was no significant yield difference with plots treated with diclofop-methyl either applied preplant incorporated or preemergence surface. Diclofop-methyl applied at 1.5 lb/A preemergence surface gave a 74% increase in yield over the untreated check. The treatments with lowered weed control resulted in lower yield reductions. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843.)

T-1. Effect of herbicide treatments on winter wheat percent stand and yield and ripgut brome control at Waha, Idaho

Treatment	Rate lb/A	Crop SR[1]	Crop VR[2]	Ripgut brome SR	Ripgut brome VR
check	0	0c	0c	0g	0e
diclofop-methyl (PPI)	.75	0c	0c	80ab	20b-d
diclofop-methyl (PPI)	1.0	0c	0c	87ab	18b-e
diclofop-methyl (PPI)	1.25	0c	0c	93ab	40a
diclofop-methyl (PPI)	2.5	2bc	5b	99a	20bc
diclofop-methyl (PES)	1.0	0c	3bc	70bc	20bc
diclofop-methyl (PES)	1.25	0c	0c	80ab	17b-e
diclofop-methyl (PES)	1.50	0c	0c	88ab	25a-c
trifluralin (PPI)	.5	3bc	3bc	27ef	3de
trifluralin (PPI)	.75	7bc	3bc	42de	5de
dinitramine (PPI)	.33	20a	10a	75a-c	18b-e
dinitramine (PPI)	.50	0c	0c	68bc	10c-e
diclofop-methyl + SN-533 (PPI)	.5 + .5	3bc	0c	50c-e	5de
diclofop-methyl + SN-533 (PPI)	1.75 + .5	0c	0c	53cd	13b-e
diclofop-methyl + R-40244 (PES)	1.0 + 1.0	3bc	3bc	94ab	30ab
propaclor (PES)	1.0	0c	0c	13fg	0e
propaclor (PES)	2.0	13ab	3bc	12fg	0e
propaclor (PES)	3.0	2c	2bc	35d-f	3de

1/ SR = Stand reduction

2/ VR = Vigor reduction

Means followed by the same letter are not significantly different at the .05 level.

T-2. Effect of herbicide treatments on winter wheat percent stand and yield and ripgut brome control at Waha, Idaho

Treatment	Rate lb/A	Bu/A	*Percent yield by weight of check
check	0	28e	100e
diclofop-methyl (PPI)	.75	40a-d	143a-e
diclofop-methyl (PPI)	1.0	30a-e	144a-e
diclofop-methyl (PPI)	1.25	38a-e	143a-e
diclofop-methyl (PPI)	2.0	44ab	165ab
diclofop-methyl (PES)	1.0	36a-e	132a-e
diclofop-methyl (PES)	1.25	44ab	164a-c
diclofop-methyl (PES)	1.5	46a	174a
trifluralin (PPI)	.5	34b-e	130a-e
trifluralin (PPI)	.75	30c-e	115de
dinitramine (PPI)	.33	33b-e	120b-e
dinitramine (PPI)	.5	29de	106de
diclofop-methyl + SN-533 (PPI)	.5 + .5	33b-e	119b-e
diclofop-methyl + SN-533 (PPI)	.75 + .5	41a-c	150a-d
diclofop-methyl + R-40244 (PES)	1.0 + 1.0	35a-e	128a-e
propaclor (PES)	1.0	32c-e	116c-e
propaclor (PES)	2.0	28de	101e
propaclor (PES)	3.0	33b-e	121b-e

* Percent yield figured on a per replicate basis.

Means followed by the same letter are not significantly different at the .05 level.

The effect of fall applied dicamba on winter wheat. Wattenbarger, D. W. and W. S. Belles. A Banvel dissipation study was initiated in Nez Perce County on September 14, 1977. Dicamba liquid, dicamba 5G (granular) and a dicamba 2,4-D combination were applied approximately 30 days before planting winter wheat. The previous crop was dry peas; the area was relatively weed-free.

Plots were harvested on August 18, 1978 with a Hege plot combine. The harvest area excluded side and end border areas. The wheat was further cleaned, weighed and test weights taken.

Test weights were not affected by any treatment. Wheat yield compared to the control was significantly reduced by one treatment, the 8.0 lb ai/A of dicamba 5G granules which resulted in a 23% yield reduction. Yields resulting from this treatment were not significantly less than those from the dicamba plus 2,4-D at .75 plus 2.25 and 2.0 + 6.0 lb ai/A, however. Dicamba at .25, .50 and 1.0 lb ai/A and dicamba granules at 2.0 and 3.0 lb ai/A as well as the dicamba plus 2,4-D at 1.0 and 3.0 lb ai/A treatments did not significantly affect wheat yields compared to the control. Weed populations, as previously pointed out, were sparse and were probably not a factor in affecting yields. Dicamba at rates up to 2.0 lb ai/A, (in combination with 2,4-D) and dicamba granules at 2.0 and 3.0 lb ai/A did not adversely affect winter wheat yields when the wheat was planted 30 days after treatment. (Idaho Agricultural Experiment Station, Moscow, ID).

Herbicide[1/]	Rate lb ai/A	Test Weight	Yield bu/A
Dicamba + 2,4-D (amine)	.5 + 1.5	60.2a[2/]	71a[2/]
Dicamba + 2,4-D (amine)	.75 + 2.25	59.5a	63ab
Dicamba + 2,4-D (amine)	1.0 + 3.0	59.9a	71a
Dicamba + 2,4-D (amine)	2.0 + 6.0	60.0a	67ab
Dicamba	.25	59.5a	70a
Dicamba	.50	59.6a	70a
Dicamba	1.0	60.4a	72a
Dicamba (5G)	2.0	60.0a	70a
Dicamba (5G)	3.0	60.7a	69a
Dicamba (5G)	8.0	60.2a	57b
Check	0	59.9a	74a

1/ Herbicides applied 30 days before seeding.

2/ Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's multiple range test.

Greenhouse screening trials of herbicide efficacy on jointed goatgrass and 'Centurk' winter wheat. Donald, W.W. Jointed goatgrass (*Aegilops cylindrica* Host) is a developing weed problem in the winter wheat-fallow rotation in some parts of eastern Colorado. Not only does this weed compete with winter wheat to reduce yields, but it lowers the quality of the harvest. There were few published reports of herbicide efficacy on jointed goatgrass, either in winter wheat, chemical fallow, sorghum, or millets. The latter spring-sown cereals are the only economically feasible, alternative crops for rotation with winter wheat in Colorado. The objective of this greenhouse screening trial was to determine which herbicides controlled this weed selectively in winter wheat and which controlled both species.

'Centurk' winter wheat and jointed goatgrass seed, gathered near Genoa in 1978, were planted in green plastic 'Compac' pots (16.5 x 12 x 6 cm) at a density of 50 to 100 plants per pot. The potting mixture consisted of a 1:1:1 mixture of sand, perlite, and soil. The latter was a clay loam (39% sand, 33% silt, 28% clay, 2.5% OM, pH 8.0, CEC 17 meq/100 g). Fertilizer pellets (Osmocote 14-14-14 controlled release fertilizer) were added to the surface and the pots were watered daily. The day and night temperature ranged between 29 to 35 C and 18 to 21 C, respectively. Sunlight was supplemented with flourescent lighting to give a day:night photoperiod of 14:10 hr, respectively. For preemergence or preplant incorporated treatments, plants were sprayed at planting and harvested after three weeks. For postemergence treatments, plants were sprayed after three weeks of growth and harvested after an additional two weeks. The wheat and goatgrass seedlings were at the 2.5 to 3 leaf stage at the time of postemergence treatments. At the end of each experiment 15 plants were harvested from one side of each pot, dried for 24 hr at 29 C in an oven, and weighed.

A moving-nozzle chamber sprayer was used with an '8001 Tee-jet' nozzle tip operated at 20 psi delivering 20.7 gpa at a rate of 0.59 mph.

Each trial experiment was conducted as a completely randomized design with three replicate pots per treatment. Each trial was repeated once in time. Data were subjected to a one-way ANOVA at F = 0.05. If results were significant, means were separated by Duncan's multiple range test at p = 0.0 5. Results were presented as percentage of controls with control shoot dry weight given in grams.

As expected, the triazines used in chemical fallow (atrazine, cyanazine, and metribuzin) applied either postemergence or preemergence at commercial rates caused comparable injury to both species. The level of control suggested that under field conditions, jointed goatgrass would escape these treatments and set seed given adequate soil moisture. The triazines registered in sorghum (propazine and terbutryn) were even less effective.

Of the ureas tested, tebuthiuron and methazole were the most and least effective, respectively. Methazole-treated plants remained green and appeared to be able to grow out of initial injury even at high rates of treatment. Diuron and linuron gave control comparable to atrazine.

Hexazinone, DPX 4189, terbacil, bromacil and buthidazole appeared to be nonselective and quite effective. They may have a place in chemical fallow, if their soil persistence is not too much of a problem. Difenzoquat, MSMA, bromoxynil, AXF-1080, SD 30053, SD 50661, propanil, Vel 4207, and M 4021 were totally ineffective on either goatgrass or wheat at the rates tested. Glyphosate and paraquat were very effective postemergence on both species, although glyphosate appeared to be the better of the two. Amitrole T and dalapon were much less effective as contact herbicides.

The thiocarbamate herbicides gave better control of both species than the chloroacetamides. Of the thiocarbamates tested, EPTC, vernolate, and butylate were more active on both species than either cycloate or triallate.

Of the diphenylethers tested, diclofop, bifenox, and metriflufen gave unacceptable results. Oxyflourfen and nitrofen at rates of 1.0 lb/A showed marginal, selective control of goatgrass. Of all herbicides tested, R-40244 at 0.5 and 1.0 lb/A applied preemergence of preplant incorporated showed the most promise for selective control of goatgrass in winter wheat.

Because of the design of these experiments, positional selectivity was not evaluated. It is known that triallate efficacy in controlling wild oats in spring wheat or barley is in part positional. Studies of goatgrass seed distribution in field as a function of depth indicate that 75 to 79% of the soil seed reserve lies in the top 1.5 inches. Winter wheat is planted deeper, between 2.5 and 3 inches. (Department of Botany and Plant Pathology, Colorado State University, Ft. Collins, CO, 80523).

Herbicide efficacy on jointed goatgrass and 'Centurk' winter wheat in greenhouse screening trials

Herbicide	Rate (lb/A)	Shoot dry weight/15 plants (% of control)[1/]			
		Wheat		Jointed Goatgrass	
		Replicate 1	Replicate 2	Replicate 1	Replicate 2
Metribuzin	0.3 pre	43% cd	45% cd	55% b	33% cd
Metribuzin	0.5 pre	40% d	45% cd	34% c	33% cd
Atrazine	0.5 pre	50% bc	52% bc	43% bc	33% cd
Atrazine	1.0 pre	44% cd	42% c	38% c	28% d
Cyanazine	1.0 pre	41% cd	45% c	43% c	33% cd
Cyanazine	2.0 pre	42% cd	45% c	41% bc	33% cd
Terbutryn	1.0 pre	51% b	52% bc	52% bc	39% bc
Terbutryn	2.0 pre	48% b-d	55% b	38% c	44% b
Propazine	1.0 pre	45% cd	42% c	45% bc	39% bc
Propazine	2.0 pre	48% b-d	45% c	45% bc	39% bc
Control dry weight:		0.33 g a	0.31 g a	0.14 g a	0.18 g a
Metribuzin	0.3 post	57% c	59% bc	42% bc	84% b
Metribuzin	0.5 post	48% c	52% bc	50% b	42% d
Atrazine	0.5 post	68% b	57% bc	56% b	58% cd
Atrazine	1.0 post	61% b	60% bc	51% b	55% cd
Cyanazine	0.5 post	69% b	60% bc	47% c	51% cd
Cyanazine	1.0 post	61% b	55% bc	51% b	40% d
Terbutryn	1.0 post	64% b	62% b	45% bc	39% d
Terbutryn	2.0 post	57% c	50% c	58% b	62% bc
Terbutryn	3.0 post	61% b	58% bc	45% bc	42% d
Control dry weight:		1.45 g a	0.97 g a	0.95 g a	0.69 g a
Diuron	0.5 pre	44% bc	50% b	51% b	50% c
Diuron	1.0 pre	32% cd	33% c	37% c	27% d
Tebuthiuron	0.5 pre	24% d	30% c	14% d	27% d
Tebuthiuron	1.0 pre	24% d	28% c	14% d	27% d
Linuron	0.5 pre	59% b	54% b	57% b	41% cd
Linuron	1.0 pre	37% cd	50% b	34% c	41% cd
Methazole	0.5 pre	----	106% a	----	68% b
Methazole	1.0 pre	----	43% b	----	68% b
Methazole	2.0 pre	----	33% c	----	36% d
Control dry weight:		0.63 g a	0.46 g a	0.35 g a	0.22 g a
Diuron	0.5 post	73% b	64% bc	64% bc	82% b
Diuron	1.0 post	56% d	69% bc	53% cd	70% b
Tebuthiuron	0.5 post	52% d	52% c	56% cd	63% b
Tebuthiuron	1.0 post	43% e	57% c	49% d	71% b
Linuron	0.5 post	66% bc	74% b	72% b	67% b
Linuron	1.0 post	59% cd	----	58% cd	----
Control dry weight:		1.85 g a	1.35 g a	1.38 g a	0.82 g a

1/ Means in a subtrial column followed by the same letter do not differ at p = 0.05 by Duncan's multiple range test.

Herbicide efficacy on jointed goatgrass and 'Centurk' winter wheat in greenhouse screening trials (continued)

Herbicide	Rate (lb/A)		Shoot dry weight/15 plants (% of control)[1/]			
			Wheat		Jointed Goatgrass	
			Replicate 1	Replicate 2	Replicate 1	Replicate 2
Methazole	1.0	pre	58% c	111% a	84% c	85% b
Methazole	2.0	pre	38% de	75% c	42% b	85% b
Bromoxynil	1.0	pre	75% b	111% a	111% b	69% b
Bromoxynil	2.0	pre	75% b	86% bc	132% a	61% b
Hexazinone	0.13	pre	27% ef	103% ab	26% d	69% b
Hexazinone	0.25	pre	20% f	46% d	37% d	61% b
DPX 4189	0.25	pre	42% d	86% bc	32% d	54% b
DPX 4189	0.50	pre	35% de	75% c	37% d	46% b
DPX 4189	1.0	pre	31% de	53% d	32% d	38% b
Control dry weight:			0.55 g a	0.28 g ab	0.19 g bc	0.13 g ab
Methazole	1.0	post	52%	47%	61% b-d	47% c-e
Methazole	2.0	post	59%	54%	46% d	52% cd
Bromoxynil	1.0	post	57%	59%	75% b	71% b
Bromoxynil	2.0	post	69%	100%	67% bc	101% a
Hexazinone	0.13	post	80%	35%	51% d	31% e
Hexazinone	0.25	post	62%	52%	58% cd	31% e
DPX 4189	0.25	post	69%	58%	62% b-d	28% e
DPX 4189	0.50	post	100%	59%	58% cd	58% bc
Amitrole T	3.0	post	82%	66%	68% bc	60% bc
Amitrole T	6.0	post	81%	67%	43% d	60% bc
MSMA	3.0	post	92%	79%	45% d	37% de
MSMA	6.0	post	100%	61%	72% b	42% de
AXF-1080	0.5	post	90%	112%	43% d	54% c
AXF-1080	1.0	post	101%	75%	100% a	109% a
AXF-1080	2.0	post	95%	84%	111% a	50% cd
Control dry weight:			0.85 g NS	1.82 g NS	0.69 g a	1.47 g a
Glyphosate	0.25	post	56% c	44% d	45% c	45% c
Glyphosate	0.50	post	55% d	33% d	48% d	55% c
Paraquat	0.15	post	83% b	63% c	81% b	75% b
Paraquat	0.25	post	66% c	72% bc	52% c	75% b
Difenzoquat	1.5	post	106% a	85% ab	74% b	90% a
Difenzoquat	2.0	post	99% ab	60% cd	71% b	90% a
Control dry weight:			1.28 g ab	1.60 g a	0.70 g a	0.67 g a
Terbacil	0.5	post	52% b	34% bc	58% b	46% b
Terbacil	1.0	post	38% c	28% c	68% b	39% b
Bromacil	0.5	post	47% bc	40% bc	54% b	52% b
Bromacil	1.0	post	50% bc	40% bc	50% b	40% b
Buthidazole	0.5	post	53% b	48% b	56% b	38% b
Buthidazole	1.0	post	47% bc	35% bc	56% b	54% b
Control dry weight:			1.31 g a	1.19 g a	0.50 g a	0.82 g a

1/ Means in a subtrial column followed by the same letter do not differ at p = 0.05 by Duncan's multiple range test.

Herbicide efficacy on jointed goatgrass and 'Centurk' winter wheat in greenhouse screening trials (continued)

Herbicide	Rate (lb/A)	Shoot dry weight/15 plants (% of control)[1/]			
		Wheat		Jointed Goatgrass	
		Replicate 1	Replicate 2	Replicate 1	Replicate 2
Triallate	2.0 ppi	51% b	56% c	31% b	71% b
Triallate	4.0 ppi	32% c	44% cd	31% b	50% c
EPTC	2.0 ppi	0% f	0% f	0% e	0% e
EPTC	4.0 ppi	0% f	0% f	0% e	0% e
Vernolate	2.0 ppi	0% f	0% f	0% e	0% e
Vernolate	4.0 ppi	0% f	0% f	0% e	0% e
Butylate	2.0 ppi	5% f	16% e	9% d	8% e
Butylate	4.0 ppi	0% f	12% ef	0% e	0% e
Cycloate	1.0 ppi	22% d	49% c	25% bc	79% b
Cycloate	2.0 ppi	10% e	16% e	28% bc	33% d
Cycloate	4.0 ppi	0% f	21% e	0% e	8% e
R-40244	0.5 ppi	47% b	79% b	25% bc	25% d
R-40244	1.0 ppi	29% cd	53% c	19% cd	29% d
R-40244	2.0 ppi	24% cd	30% de	16% d	25% d
Control dry weight:		0.59 g a	0.43 g a	0.32 g a	0.24 g a
Propachlor	3.0 pre	70% bc	56% c	53% b-d	75% b
Propachlor	6.0 pre	45% d	44% de	47% cd	60% c
Metolachlor	1.0 pre	77% b	68% b	58% b-d	40% de
Metolachlor	2.0 pre	46% d	23% f	53% b-d	30% e
Alachlor	1.0 pre	56% cd	68% b	53% b-d	45% d
Alachlor	2.0 pre	44% d	38% e	42% d	40% de
Diethatyl	1.0 pre	70% bc	56% cd	68% b	50% cd
Diethatyl	2.0 pre	51% cd	53% cd	63% bc	45% d
Diethatyl	3.0 pre	44% d	47% d-e	58% b-d	40% de
Control dry weight:		0.43 g a	0.34 g a	0.19 g a	0.20 g a
SD 30053	0.5 pre	91% d	----	100% b-d	----
SD 30053	1.0 pre	113% a	112% a-c	100% b-d	83% b-d
SD 30053	2.0 pre	113% a	109% bc	115% b-d	72% c-e
SD 50661	0.5 pre	110% ab	----	95% cd	----
SD 50661	1.0 pre	100% b-d	128% a	80% e	89% a-d
SD 50661	2.0 pre	76% e	109% bc	60% f	105% ab
SD 45328-3-6	0.5 pre	98% c	----	110% ab	----
SD 45328-3-6	1.0 pre	113% a	106% bc	100% b-d	94% a-c
SD 45328-3-6	2.0 pre	109% ab	119% a-c	100% b-d	100% a-c
Propanil	0.5 pre	104% a-c	----	110% ab	----
Propanil	1.0 pre	104% a-c	106% b	115% a	94% a-c
Propanil	2.0 pre	100% b-d	109% b	90% d	100% a-c
Oxyfluorfen	0.5 pre	89% d	109% bc	105% a-c	111% a
Oxyfluorfen	1.0 pre	43% f	122% ab	15% g	61% de
Oxyfluorfen	2.0 pre	0% g	103% c	0% h	50% e
Control dry weight:		0.46 g b-d	0.32 g c	0.20 g b-d	0.18 g ab

1/ Means in a subtrial column followed by the same letter do not differ at p = 0.05 by Duncan's multiple range test.

Herbicide efficacy on jointed goatgrass and 'Centurk' winter wheat in greenhouse screening trials (continued)

Herbicide	Rate (lb/A)		Shoot dry weight/15 plants (% of control)[1/]			
			Wheat		Jointed Goatgrass	
			Replicate 1	Replicate 2	Replicate 1	Replicate 2
Terbacil	0.5	pre	33% ef	60% c	33% c	46% e
Terbacil	1.0	pre	30% ef	48% c	29% c	46% e
Bromacil	0.5	pre	34% e	56% c	21% d	46% e
Bromacil	1.0	pre	26% f	48% c	17% d	46% e
Dalapon	3.0	pre	53% d	72% b	38% c	69% bc
Dalapon	6.0	pre	47% d	48% c	38% c	54% de
R-40244	0.5	pre	79% c	80% b	29% cd	100% cd
R-40244	1.0	pre	72% c	104% a	33% c	61% cd
R-40244	2.0	pre	56% d	76% b	29% cd	69% de
Buthidazole	0.5	pre	26% f	56% c	17% d	54% de
Buthidazole	1.0	pre	30% ef	56% c	21% d	61% cd
Buthidazole	2.0	pre	26% f	32% d	21% d	69% bc
Vel 4207	0.25	pre	91% b	108% a	113% a	77% b
Vel 4207	0.50	pre	77% c	100% a	88% b	108% a
Control dry weight:			0.43 g a	0.25 g a	0.25 g b	0.13 g a
M4021	0.5	post	71% b	100% a	79% ab	65% b
M4021	1.0	post	61% bc	64% cd	103% a	77% b
Dalapon	3.0	post	60% bc	74% c	55% cd	77% b
Dalapon	6.0	post	49% c	54% d	42% d	55% b
R-40244	0.5	post	70% b	86% ab	72% a-c	62% b
R-40244	1.0	post	55% bc	96% a	67% b-d	75% b
Vel 4027	0.25	post	60% bc	86% bc	75% a-c	62% b
Vel 4027	0.50	post	68% b	110% a	64% b-d	108% a
Control dry weight:			1.08 g a	1.14 g a	0.76 g a	0.65 g a
Bifenox	1.0	pre	86% b	91% b	100% b	100% b
Bifenox	2.0	pre	75% bc	106% ab	110% a	94% b
Nitrofen	1.0	pre	59% c	111% a	87% bc	75% c
Nitrofen	2.0	pre	66% c	109% ab	47% ab	62% d
Diclofop	1.0	pre	79% b	103% ab	93% bc	81% c
Diclofop	2.0	pre	77% bc	106% ab	113% ab	94% d
Metriflufen	0.5	pre	34% d	94% ab	93% bc	131% a
Metriflufen	1.0	pre	32% d	65% c	73% c	81% c
Metriflufen	1.5	pre	43% d	41% d	80% c	75% c
Oxyflourfen	0.5	pre	48% cd	68% c	0% d	6% e
Oxyflourfen	1.0	pre	41% d	62% d	0% d	0% e
Oxyflourfen	2.0	pre	43% d	35% d	0% d	0% e
Control dry weight:			0.44 g a	0.34 g ab	0.15 g b	0.16 g b

1/ Means in a subtrial column followed by the same letter do not differ at p = 0.05 by Duncan's multiple range test.

Canada thistle control in small grains with DPX-4189. J. O. Evans and R. W. Gunnell. Canada thistle remains one of the most difficult weed threats in small grain fields in Utah. The acreage infested with Canada thistle is steadily rising despite the considerable effort in recent years to control it. The presently registered herbicides have proven to be moderately effective against the weed but they all have notable weaknesses. Picloram has been shown to express the greatest activity for selective control in small grains. Combinations of 2,4-D and dicamba are useful in wheat but not recommended for barley.

DPX 4189 at one-half ounce per acre or more has demonstrated excellent control of Canada thistle. It has also shown adequate safety on small grains. The compound has demonstrated remarkable inhibitory action on Canada thistle while in the small rosette stage, an advantage in small grain weed control. DPX 4189 expressed considerable activity towards Canada thistle throughout the growing season. (Utah Agricultural Experiment Station, Logan, Utah 84322.)

Table 1. An evaluation of DPX-4189 for the control of perennial broadleaved weeds in small grains

Treatment	Rate (oz/A)	Canada thistle response		
		% Control	Injury index[a]	Regrowth[b]
Control	--	0	0	10
DPX 4189	0.125	65	8	3
DPX 4189	0.250	79	9	4
DPX 4189	0.500	93	9	1
DPX 4189	1.000	98	9	1
dicamba	6.000	27	3	9
picloram	1.000	73	5	3

a) Injury index based on a 0-10 scale. 0 indicated no visual effects on the plants, 10 being complete kill.

b) Regrowth of Canada thistle 60 days after application and based on a 0-10 scale. 0 meaning no regrowth and 10 indicating regrowth not distinguishable from the control plants.

Table 2. An evaluation of DPX 4189 activity on Luke winter wheat

Treatment	Rate (oz/A)	Wheat Response	
		Injury index[a]	Seed viability(%)[b]
Control	--	0	98
DPX 4189	0.125	0	99
DPX 4189	0.250	0	97
DPX 4189	0.500	0	99
DPX 4189	1.000	0	97
dicamba	6.000	2	--[c]
picloram	1.000	0	--[c]

a) Injury index on a 0-10 scale. 0 indicates no visual injury symptoms expressed. 10 means complete kill.

b) Seed viability determined by germinating harvested seed collected from the treated plots. Germination recorded in a germination chamber maintained at 30 C.

c) Germination not evaluated.

Spring-applied herbicides for weed control in fallow-system winter wheat. Humburg, N. E. and H. P. Alley. Herbicides were applied May 3, 1978, nine months after a ripe wheat crop was totally lost to hail. The field had not been tilled following harvest. Broadcast applications were made with a knapsack sprayer that delivered 40 gpa of herbicide-water solution. Weed stages of growth and heights were: erect knotweed, 2 to 5-leaf and 1 to 2-in; slimleaf lambsquarters, 1 to 2-leaf and 0.5-in; downy brome, 2 to 3-leaf and 1 to 2-in; and volunteer wheat, 1 to 2-leaf and 2 to 3-in. Treatments were made between 11:05 and 11:55 a.m. MDT when environmental conditions were as follows: partly cloudy to overcast sky; air temperature, 59 F; relative humidity, 62%; soil temperatures were 69, 60, 53 and 48 F for the surface and depths of 1, 2, and 4 inches, respectively. The sandy loam soil (60.0% sand, 23.8% silt and 16.2% clay) had 1.8% organic matter and 6.3 pH. Treatments were replicated three times, with 9 by 30-ft plots arranged in a randomized complete block design. Wheat was planted in the fall of 1978.

Treatments were evaluated June 2, 1978 and May 30, 1979 by visually rating control of each weed species. Atrazine, cyanazine + atrazine and buthidazole provided excellent control of weeds and volunteer wheat on fallow land in 1978, which continued through the crop growing season of 1979. R-40244 alone and with paraquat or glyphosate partially controlled volunteer wheat, and gave excellent but oftentimes inconsistent results in controlling erect knotweed, slimleaf lambsquarters and downy brome when evaluated in 1978; in early summer 1979 control of broadleaved weeds was excellent but control of downy brome had diminished. Glyphosate alone and glyphosate with X-77 surfactant, 2,4-D amine or dicamba were ineffective at the rates materials were applied; control of volunteer wheat ranged from 10 to 41%. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-998).

Spring-applied herbicides for weed control in fallow-system winter wheat

Herbicide[1]	Rate lb/A	Percent weed control[2] 1978 KW	LQ	DB	VOL WHT	1979 KW	LQ	DB
cyanazine + paraquat	2.4 + 0.25	100	100	100	100	3	2	88
cyanazine + atrazine	1.6 + 0.8	100	100	100	99	89	94	96
cyanazine + atrazine + paraquat	1.6 + 0.8 + 0.25	100	100	100	100	95	96	98
atrazine	0.5	100	100	100	89	77	98	100
atrazine	0.8	100	100	100	97	98	100	100
buthidazole + CN-110-242	0.25	100	100	100	82	92	43	77
buthidazole + CN-110-242	0.38	100	100	100	92	72	56	60
buthidazole + CN-110-242	1.0	100	100	100	99	98	100	98
R-40244	2.0	90	x[3]	x	21	92	75	3
R-40244 + paraquat	2.0 + 0.25	97	100	97	35	92	82	30
R-40244 + glyphosate	2.0 + 0.75	x	100	98	50	97	92	58
glyphosate	0.38	0	x	x	10	0	0	0
glyphosate + X-77	0.38				28	0	0	0
glyphosate + 2,4-D amine	0.38 + 0.12	0	x	x	41	0	0	0
glyphosate + 2,4-D amine	0.38 + 0.25	0	x	x	12	0	0	0
glyphosate + dicamba	0.38 + 0.12	x	x	x	13	0	0	0
glyphosate + dicabma	0.38 + 0.25	x	x	x	25	0	0	0
Check	---	0	0	0	0	0	0	0
plants/sq ft		*3.7*	*1.7*	*4.5*	*12.1*	*13.7*	*4.9*	*8.5*

[1]Herbicides applied May 3, 1978. X-77 and CN-110-242 surfactants added at rates of 0.5% v/v water solution.
[2]Visual evaluations on June 2, 1978 and May 30, 1979. Abbreviations: KW = erect knotweed; LQ = slimleaf lambsquarters; DB = downy brome; VOL WHT = volunteer wheat.
[3]x = species present but could not be rated for control in all plots.

Post-harvest herbicide treatments for weed control in fallow-system winter wheat. Humburg, N. E. and H. P. Alley. Herbicides were applied to plots in a field where hail had totally destroyed a crop of mature wheat on July 14, 1977. Treatments were made August 30, 1977; the principal vegetation was volunteer wheat. A knapsack sprayer that delivered 40 gpa of water solution was used to broadcast-apply herbicides on 9 by 30 ft plots. Each treatment was replicated three times and plots were arranged in randomized complete blocks. Environmental conditions at the time of herbicide application were: clear sky; air temperature 82 F; relative humidity 36%; soil temperatures for the surface and depths of 1, 2 and 4 inches were 109, 97, 88 and 75 F, respectively. Soil was sandy loam (70% sand, 21% silt and 9% clay) with a pH of 6.1 and 2.0% organic matter. Wheat was planted in the fall of 1978.

Visual evaluations of weed control were made on June 2, 1978 and May 30, 1979. Control of broadleaved weeds and downy brome in 1978 was essentially 100% by all herbicide treatments. Control of volunteer wheat in early summer 1978 ranged from 67 to 100%, the result of both foliar- and root-uptake of herbicides. Paraquat or glyphosate was tank-mixed with most treatments to give partial immediate control of volunteer wheat. With the exception of buthidazole at 2.0 lb/A, none of the treatments provided good control of broadleaved weeds in 1979. Virtually no herbicidal activity against broadleaved weeds from 2.4 lb/A applications of cyanazine remained in 1979. Control of downy brome ranged from 32 to 84%, with no distinct differences among herbicides. (Wyo. Agric. Exp. Sta., Laramie, 82071, SR-997).

Post-harvest herbicide treatments for weed control in fallow-system winter wheat

Herbicide[1]	Rate lb/A	Percent weed control[2] 1978 VOL WHT	1979 KW	1979 LQ	1979 BW	1979 RT	1979 DB
atrazine + paraquat	1.0 + 0.25	84	12	12	2	17	56
atrazine + glyphosate	1.0 + 0.5	86	12	18	17	10	58
cyanazine + paraquat	2.4 + 0.25	67	0	7	0	0	42
cyanazine + atrazine + paraquat	2.0 + 1.0 + 0.25	95	10	23	18	20	58
cyanazine + atrazine + glyphosate	2.0 + 1.0 + 0.5	98	30	30	33	44	70
buthidazole + glyphosate	0.5 + 0.5	91	13	12	23	0	32
buthidazole + glyphosate	0.75 + 0.5	100	55	30	32	55	66
buthidazole + glyphosate	1.0 + 0.5	100	38	37	35	43	63
buthidazole + glyphosate	2.0 + 0.5	100	92	87	48	74	84
hexazinone + WK	1.0	100	30	0	0	20	62
hexazinone + glyphosate + WK	1.0 + 0.5	98	38	0	27	18	54
metribuzin + paraquat	1.0 + 0.25	79	12	0	9	10	58
metribuzin + glyphosate	1.0 + 0.5	71	13	0	0	34	60
terbutryn + atrazine	1.6 + 1.0	95	28	27	25	10	80
terbutryn + metolachlor + atrazine	1.6 + 1.5 + 1.0	87	7	12	8	18	74
Check	---	0	0	0	0	0	0
plants/sq ft		*16.5*	*6.1*	*14.0*	*1.5*	*0.7*	*3.6*

[1]Herbicides applied August 30, 1977. Surfactant WK added at 0.5% v/v water solution.

[2]Visual evaluations June 2, 1978 and May 30, 1979. Abbreviations: VOL WHT = volunteer wheat; KW = erect knotweed; LQ = common and slimleaf lambsquarters; BW = wild buckwheat; RT = Russian thistle; DB = downy brome.

The effect of DPX 4189 on winter wheat and rotational crops. Brewster, Bill D., Arnold P. Appleby, and Patrick K. Boren. 'Stephens' winter wheat was treated in the two-tiller growth stage with five rates of DPX 4189 in two separate field trials. Each trial was designed as a randomized complete block with four replications. Plots were 5 by 6 m.

Nineteen days after treatment, one trial was treated with glyphosate to kill the wheat. Seventy-one days after the glyphosate application, the trial was rototilled, harrowed, and planted to green beans, alfalfa, sweet corn, and Italian ryegrass. After wheat was harvested from the second trial, the soil was rototilled and harrowed. Winter rape, alfalfa, Italian ryegrass, and sugarbeets were planted 175 days after treatment.

Fresh weights were obtained by clipping the crops at ground level. Significant reductions in fresh weight occurred with all rates of DPX 4189 in all spring-planted rotational crops (Table 1). Green beans appeared to be somewhat more tolerant than the other crops.

Wheat culm height was reduced by all rates of DPX 4189 (Table 1). Wheat grain yield followed the same pattern as culm height but none of the differences were statistically significant at the 5% probability level. Rotational crops planted 175 days after application of DPX 4189 were all injured at the lowest rate of the herbicide. (Crop Science Department, Oregon State University, Corvallis, OR 97331)

Table 1. Fresh weights of rotational crops planted 90 days after treatment with DPX 4189

Treatment	Rate (kg/ha)	Green beans	Sweet corn	Italian ryegrass	Alfalfa
		(g/m)			
DPX 4189	0.035	121.3	16.4	18.0	5.2
DPX 4189	0.07	122.1	6.8	4.9	2.7
DPX 4189	0.14	98.1	1.9	6.6	1.9
DPX 4189	0.28	59.3	0.5	1.6	0.5
DPX 4189	0.56	47.0	0	0.5	0.3
Untreated control	0	295.1	125.1	137.7	53.3
	$LSD_{.05}$	42.6	85.0	45.6	31.1
	$LSD_{.01}$	59.0	n.s.	63.1	n.s.

Table 2. Wheat height and grain yield and fresh weight of rotational crops planted 175 days after treatment with DPX 4189

Treatment	Rate (kg/ha)	Wheat height (cm)	Wheat grain yield (kg/ha)	Winter rape	Sugar-beets	Italian ryegrass	Alfalfa
				(g/m)			
DPX 4189	0.035	91	8888	25.0	0.87	5.6	1.04
DPX 4189	0.07	86	8865	19.1	0.66	3.0	0.55
DPX 4189	0.14	85	8694	9.9	0.22	2.2	0.46
DPX 4189	0.28	83	8531	2.7	0.33	1.6	0.16
DPX 4189	0.56	80	8562	3.1	0.11	1.3	0.03
Untreated control	0	96	9285	76.8	6.04	11.5	5.14
	$LSD_{.05}$	3.2	n.s.	20.4	1.39	1.6	1.45
	$LSD_{.01}$	4.4	-	28.2	1.91	2.2	2.16

Multi-crop postemergence summer annual grass control screening trial. Norris, R. F., D. R. Ayres, and R. A. Lardelli. Control of mostsummer annual grasses in California field and vegetable crops is almost entirely achieved through the use of preplant incorporated or preemergence herbicides. The herbicides available for postemergence annual grass control have typically been too toxic to the crops, or did not provide adequate grass control. Several new herbicides are being developed that offer greatly improved selective postemergence grass control in summer dicotyledon crops.

Several herbicides, see table for chemicals and rates tested, were applied to a multi-crop screening trial located at the University of California farm at Davis. Crops and weeds were drill seeded, with one or two rows of each species (weeds or crops) on the top of each 30 inch center bed. One half of the experiment was irrigated up on June 8, 1979; the other half was irrigated on June 18, 1979. The two irrigation dates provided two stages of plant growth at the time of spraying. At spraying, the plants were at the following growth stages (younger and older respectively): barnyardgrass (1 to 3-lf and 2- to 5-lf), yellow foxtail (1- to 2-lf and 2- to 4-lf), corn (4 to 6 inches and 12 inches), sorghum (2 to 4 inches and 6 to 10 inches), wheat (2 to 4 inches and 4 to 6 inches), alfalfa (1 to 2 inches and 2 to 4 inches), kidney beans (2-lf and 2- to 6-lf), carrots (1 to 2 inches and 2 to 3 inches), onions (1 to 2 inches and 1 to 3 inches), safflower (2-lf and 2- to 4-lf), sugarbeets (2-lf and 2- to 4-lf), and tomatoes (1 to 2 inches and 2 to 3 inches). The herbicideswere applied on June 27, 1979, using a CO_2 backpack sprayer, set at 30 psi with 8004E nozzles and delivering 40 gal/A. Plot size was 8 ft by 60 ft; each herbicide treatment was replicated three times using a complete block randomized design. Air temperatures at and following spraying ranged from 87 F to 100 F. Sufficient irrigation was provided to maintain vigorous plant growth. Visual evaluations of crop injury and weed control were made on July 11, 1979; results of a later evaluation were essentially identical and are not presented.

Dalapon caused moderate injury to most dicotyledon crops; cucumbers and kidney beans were the most severely affected. SSH-44 wasalso injurious to most dicotyledon crops, particularly to cucumbers. This herbicide also reduced the vigor of purslane and lambsquarters present in the plot area. None of the other herbicides showed phytotoxic symptoms on the dicotyledon crops; selectivity was excellent.

SSH-44 and AC-206784 showed very little activity against crop or weed grasses. Dalapon, as anticipated, stunted all the grass species severely, but killed very few plants. AXF-1080 at 2.0 lb/A provided good control of yellow foxtail and barnyardgrass when treated at the earlier growth stage Wheat showed a high degree of tolerance to this herbicide. Diclofop also showed good grass control at 1.5 lb/A; 6.0 lb/A gave almost complete kill of all grass species except wheat. These data demonstrated that wheat has a very high tolerance to diclofop. BAS-9052 and MAAG Ro-13-8895 both provided outstanding control of all grasses; these herbicides did not show any selectivity to any grass species in this test. Both BAS-9052 and MAAG Ro-13-8895 thus appear to offer much superior selective postemergence annual grass control in dicotyledon crops than has been possible prior to this time and would thus warrant considerable further testing. (Botany Department, University of California, Davis).

Multi-crop postemergence seedling annual grass control screening trial

Test species	Irri. date	diclofop 1.5	diclofop 6.0	BAS-9052 0.5	BAS-9052 2.0	RO-13-8895 0.25	RO-13-8895 1.0	AXF-1080 0.5	AXF-1080 2.0	AC-206784 1.5	AC-206784 6.0	SSH-44 0.5	SSH-44 1.0	dalapon 4.0	check -
		herbicide and rate (Lb/A)													
Barnyardgrass	6/8	8.0	9.8	9.0	10.0	8.3	10.0	1.3	7.3	0.3	1.0	0.3	0.3	3.3	0.0
control	6/18	9.4	9.8	9.9	10.0	9.0	10.0	1.3	8.7	0.0	1.7	1.0	0.7	4.0	0.3
Yellow foxtail	6/8	5.3	8.2	7.2	7.3	8.2	9.5	1.0	3.7	0.7	0.3	0.3	0.3	2.0	0.0
control	6/18	8.7	9.8	9.5	9.8	9.2	10.0	2.0	9.4	0.7	0.3	0.3	1.7	3.0	0.3
Corn injury	6/8	9.3	9.7	8.2	10.0	9.5	10.0	1.3	5.3	0.7	0.7	0.7	0.5	2.7	0.0
	6/18	9.5	10.0	9.2	9.8	9.8	10.0	1.3	7.7	0.2	1.0	0.7	0.3	4.3	0.0
Sorghum injury	6/8	3.0	5.7	9.7	10.0	10.0	10.0	5.3	9.3	0.2	0.0	0.0	0.7	5.7	0.0
	6/18	5.0	7.8	9.5	10.0	10.0	10.0	2.3	9.2	0.2	1.3	0.3	1.7	5.7	0.0
Wheat injury	6/8	0.0	0.3	5.7	8.3	4.0	9.3	0.7	0.3	0.0	2.0	0.0	0.0	3.7	0.0
	6/18	2.0	0.8	7.0	8.3	4.0	9.0	0.7	1.3	0.3	2.4	0.0	0.3	4.3	0.3
Alfalfa injury	6/8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	1.0	0.0
	6/18	0.0	0.0	0.2	0.7	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	2.0	0.3
Kidney bean	6/8	0.7	0.0	0.0	0.3	1.0	0.7	0.7	0.3	0.3	0.0	1.3	2.0	3.3	0.0
injury	6/18	0.3	0.3	0.7	1.3	0.7	0.3	0.3	0.3	1.3	0.3	2.7	2.7	3.3	0.0
Carrots injury	6/8	0.0	2.0	0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.7	0.0
	6/18	0.0	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.0	1.7	0.0
Cucumbers injury	6/8	0.3	0.3	0.0	0.3	0.0	0.3	1.0	0.7	0.7	0.7	2.7	5.7	4.7	0.0
	6/18	0.7	0.2	0.3	0.7	1.0	0.3	2.0	0.0	0.3	1.0	3.7	6.7	6.3	0.0
Onions injury	6/8	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	1.3	0.0
	6/18	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	1.3	0.0
Safflower injury	6/8	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.3	1.0	3.3	0.0
	6/18	0.7	0.0	0.3	0.0	0.5	0.0	1.0	0.0	0.2	0.0	1.3	1.3	4.0	0.0
Sugarbeet injury	6/8	0.0	0.3	0.3	0.0	1.2	0.7	0.7	0.7	0.3	1.3	0.3	2.3	2.0	0.3
	6/18	0.7	0.3	0.3	1.3	0.7	1.7	1.7	0.3	1.0	1.3	2.3	4.0	1.7	0.0
Tomato injury	6/8	0.5	1.0	0.2	0.0	0.7	0.2	0.4	1.0	1.0	0.7	1.7	3.0	2.0	0.0
	6/18	0.3	0.7	0.0	0.7	0.2	0.7	0.7	0.2	1.3	0.0	2.3	4.3	1.7	0.0

All data are means of three replications. Control or injury; 0 = no effect, 10 = complete kill.

Evaluation of extenders to increase the residual life of butylate and EPTC. Brenchley, R. G. Research trials on potatoes, beans, sweet and field corn were established at Parma, Idaho, to evaluate the effectiveness of two extender products (PPG-124 and R-33865) on the residual life of EPTC and butylate. Treatments were replicated four times in a randomized complete block design. Herbicide applications were made using a CO_2 propelled knapsack type sprayer equipped with a four nozzle (8004) boom utilizing 30 psi pressure which delivered 32 gpa total volume. Plot size was 7 by 40 feet. All treatments were applied pre-plant incorporated except those on potatoes which were applied post plant incorporated. Soil type was a silt loam, 1.2% organic matter, pH 7.2 with a CEC of 13 to 15 meq. Further crop and treatment information is given in the following outline.

Potatoes var. Russet Burbank

Seeding date: May 2, 1979
Herbicide application date: May 3, 1979
Weed species and population per sq. ft. PW = redroot pigweed 27.6; LQ = common lambsquarter 7.3; HNS = hairy nightshade 5.6.
Weed evaluation date: June 6, 1979, June 26, 1979
Harvest date: October 11, 1979

Beans, pinto var. Kellogg 114

Seeding date: May 21, 1979
Herbicides application date: May 5, 1979
Weed species and population per sq. ft. PW = redroot pigweed 38.4; LQ = common lambsquarters 9.7; HNS = hairy nightshade 6.9.
Weed evaluation date: June 25, 1979, July 17, 1979
Harvest date: September 13, 1979

Corn, field var. Funks 4195

Seeding date: May 29, 1979
Herbicide application date: May 24, 1979
Weed species and population per sq. ft. Redroot pigweed 21.7; hairy nightshade 7.4; common lambsquarters 1.3.
Weed evaluation date: June 28, 1979, July 19, 1979
Harvest date: October 9 to 10, 1979.

Corn, sweet var. Jubilee

Seeding date: May 29, 1979
Herbicide application date: May 25, 1979
Weed species and population per sq. ft. Redroot pigweed 8.1; hairy nightshade 8.5; common lambsquarters 3.5
Weed evaluation date: June 28, 1979, July 19, 1979
Harvest date: August 21, 1977

Results of these experiments showed that neither PPG-124 or R-33865 was effective in extending the residual life of EPTC. PPG-124 showed no response on extending the residual life of butylate. (SW Idaho Research and Extension Center, University of Idaho, Parma, Idaho 83660)

Potatoes (Table 1)

Treatment[1/]	Rate[2/] lbs/A	Percent Weed Control[3/] PW 43 DAT	PW 63	LQ 43 DAT	LQ 63	HNS 43 DAT	HNS 63	Yield[4/] CWT/A
EPTC	3.0	75	61	70	72	79	70	273.9
EPTC + PPG-124(8:1)	3.0	61	50	89	85	76	64	270.6
EPTC + R-33865 (6:1)	3.0	70	65	88	85	98	82	305.7

Corn, Field (Table 2)

Treatment[1/]	Rate[2/] lbs/A	Percent Weed Control[3/] PW 35 DAT	PW 56	LQ 35 DAT	LQ 56	HNS 35 DAT	HNS 56	Yield[4/] bu/A
Butylate	3.0	34	25	10	5	0	0	86.6
Butylate+PPG-124(8:1)	3.0	32	26	45	39	0	0	86.0
PPG-124	0.38	0	0	0	0	0	0	66.2
Butylate	4.0	69	52	0	0	0	0	100.2
Butylate+PPG-124(8:1)	4.0	49	37	0	0	0	0	106.7
EPTC + R-25788	4.0	72	47	58	58	76	62	112.6
EPTC + R-25788 + R-33865 (6:05)	4.0	78	59	55	51	91	72	113.5
EPTC + R-25788 + R-33865 (6:0.75)	4.0	90	65	68	65	93	78	107.9
EPTC + R-25788 + R-33865 (6:1.0)	4.0	87	61	48	42	90	73	130.1
EPTC + R-25788	6.0	85	62	65	61	87	75	114.8
EPTC + R-25788 + R-33865 (6:1.0)	6.0	95	69	81	72	86	75	87.8

1/ EPTC + R-25788 = Eradicane (Stauffer Chemical Co.)
Numbers in parentheses are the ratio of either Butylate or EPTC to extender.

2/ Rate expressed as ai/A of either Butylate or EPTC only.

3/ PW = redroot pigweed; LQ = common lambsquarters; HNS = hairy nightshade
DAT = Days after treatment

4/ CWT/A = 100 wts/A; T/A = Tons/A

Beans, Pinto (Table 3)

Treatment[1/]	Rate[2/] lbs/A	Percent Weed Control[3/] PW 51 DAT	PW 73	LQ 51 DAT	LQ 73	HNS 51 DAT	HNS 73	Yield[4/] lb/A
EPTC	2.25	56	41	75	72	56	51	1492
EPTC+PPG-124 (8:1)	2.25	63	47	50	43	59	53	1568
PPG-124	0.38	0	0	0	0	0	0	1128
EPTC	3.0	48	39	33	31	45	42	1400
EPTC+PPG-124(8:1)	3.0	52	41	67	61	42	43	1496

Corn, Sweet (Table 4)

Treatment[1/]	Rate[2/] lbs/A	Percent Weed Control[3/] PW 35 DAT	PW 57	LQ 35 DAT	LQ 57	HNS 35 DAT	HNS 57	Yield[4/] T/A
Butylate	3.0	46	37	24	25	0	0	1.88
Butylate+PPG-124(8:1)	3.0	45	35	40	42	0	0	1.36
Butylate	4.0	69	61	30	29	0	0	1.96
Butylate+PPG-124(8:1)	4.0	63	58	19	18	0	0	1.94
EPTC + R-25788	4.0	74	54	64	57	55	51	1.12
EPTC + R-25788 + R-33865 (6:0.5)	4.0	84	65	86	78	80	71	2.15
EPTC + R-25788 + R-33865 (6:0.75)	4.0	82	60	88	81	71	67	2.14
EPTC + R-25788 + R-33865 (6:1)	4.0	83	65	80	75	66	59	1.12
EPTC + R-25788	6.0	79	59	88	82	71	67	3.42
EPTC + R-25788 + R-33865 (6:1)	6.0	89	67	88	80	88	86	1.96

1/ EPTC + R-25788 = Eradicane (Stauffer Chemical Co.)
Numbers in parentheses are the ratio of either Butylate or EPTC to extender.

2/ Rate expressed as ai/A of either Butylate or EPTC only.

3/ PW = redroot pigweed; LQ = common lambsquarters; HNS = hairy nightshade
DAT = Days after treatment

4/ CWT/A = 100 wts/A, T/A = Tons/A

PROJECT 6

AQUATIC AND DITCHBANK WEEDS

Lars W. J. Anderson, Project Chairman

SUMMARY -

Eleven reports on aquatic weeds and six reports on ditchbank weeds were submitted. Nineteen chemicals were tested for their ability to control various aquatic weeds. One paper summarized results of a study designed to determine the amount of retention of dicamba in crops irrigated with water containing low levels of this herbicide. Another report described allelopathic interactions between dwarf spikerush and noxious aquatic weeds. A synopsis of the contributed progress reports follows and is organized by weed species.

Hydrilla - Combinations of endothall (dipotassium salt) and komeen were more effective in reducing vegetative biomass of hydrilla plants that were exposed for 6 hours in flowing water. Studies using ^{14}C-labelled fluridone showed that this herbicide translocates from roots to shoots in hydrilla, with the greatest accumulation occurring in the growing portions of the plant. Other work showed that fluridone traversed sections of hydrilla leaves more rapidly than did atrazine or simazine. The presence of the aquatic weed competitor, dwarf spikerush, caused a reduction in the number of hydrilla shoots when both plants were grown together.

Eurasian watermilfoil - Combinations of endothall and komeen more effectively reduced vegetative growth of this weed than did either herbicide alone under flowing water conditions. Control was temporary since regrowth occurred within 2 to 4 weeks. In small, outdoor pond treatments, komeen controlled this species at concentration at or above 1.0 ppmw; however, regrowth took place and retreatment was needed within 6 weeks. The presence of dwarf spikerush did not cause a reduction in numbers of Eurasian watermilfoil shoots when the two species were cultured together.

Elodea - Endothall and komeen in combination were more effective in reducing biomass of this species in moving water exposures for six hours. This species was controlled by 0.5 ppmw komeen in small pond treatments. The presence of dwarf spikerush reduced the number of shoots of elodea by about one half, indicating an allelopathic interaction.

Pondweeds (Potamogeton sp.) - Horned pondweed was controlled by 0.5 ppmw komeen in small pond treatments. Sage and curly leaf pondweed were controlled with concentration at 1.0 ppmw; regrowth of these species occurred in a few weeks. American pondweed was tolerant to up to 2.0 ppmw komeen. Extensive trials were conducted on the draw-down use of fluridone in irrigation canals for control of American and Sago pondweeds. An aqueous and pelletized formulations of fluridone were applied to canals at 4 and 8 lb/A. The pellet formulation at 8 lb/A applied with raking of soil surface was most effective. December applications were most effective, which may reflect the need for sufficient rainfall for optimal efficacy. In another study, dwarf spikerush caused a reduction

in numbers of shoots of American, Sago and Horned pondweed, which further confirms the allelopathic interaction of spikerush on secondary growth of some pondweeds.

South naiad, Common coontail, Chara, Cladophora - These weeds were effectively controlled by 0.5 ppmw komeen in treatments to small ponds. Chara and Southern naiad were most resistant and required about one week longer for control.

Dwarf spikerush - The phytotoxicity of several aquatic herbicide to this beneficial plant was investigated. Those herbicides most effective in controlling Sago pondweed but most harmful to spikerush were: diquat (0.5 ppmw), xylene (210 ppmw) and acrolein (0.5 to 4.0 ppmw). Copper sulfate was not harmful to spikerush and so could be used to control algae without destroying stands of spikerush.

Willow - Glyphosate, silvex, 2,4-D and 2,4,5-T were tested for control of this weed in grass pasture. Results showed that glyphosate applied at 0.45 μg/ha in 190 l of water controls willow. The phenoxy herbicides tested were less effective than glyphosate. However, combinations of 2,4-D and glyphosate produced fastest top kill.

Russian thistle - Various combinations of amitrole plus bromacil, hexazinone, tebuthiuron, karbutilate, fluridone or metribuzin were applied as foliar sprays to small plots (fence rows) of Russian thistle in March. Evaluations in July showed that all combination with amitrol were effective at ratio from 1 to 2 lb/A except fluridone which required only 0.5 lb/A and 1 lb/A amitrole for control.

Blue vervain - Applications of 2,4-D (amine) at 4 lb/A or glyphosate at 4 lb/A produced good and "marginal" control of this weed, respectively. Treatments were made in August.

Alkali clover, Hood canarygrass, Red orach, Ryegrass - Atrazine, Boy Met 1486, metribuzin, tebuthiuron, VEL 5026, hexazinone or amitrole were applied to the above weeds at 2 or 4 lb/A (amitrole at active compounds (amitrole was not effective). Tebuthiuron was most effective and for longest duration.

Crops - Tomatoes, corn, sugarbeets, alfalfa, cucumbers, and pinto beans. The retention of dicamba in these crops was determined following sprinkler or furrow irrigation with water containing 0.05 or 0.5 ppmw dicamba (DMA salt). No phytotoxicity was observed with the 0.05 ppmw level and only low residues were found (.007 to .05 ppmw). With 0.5 ppmw dicamba most crops exhibited some phytotoxicity symptoms and residues from .02 to 1.01 ppmw were found.

^{14}C-fluridone movement from root to foliar portions of partitioned hydrilla plants. Anderson, L. W. J. and J. Pringle. Fluridone - ^{14}C labeled, at concentrations of 0.1 and 0.5 mg/L, was added to the root compartment of a partitioning apparatus in which root and foliar portions of 20-25 cm hydrilla plants were externally separated. Each treatment rate was replicated 6 times. Root portions were contained in 200 ml black jars which were placed in 600 ml beakers. Both root and foliar portions were maintained in 1/10 strength Hoagland's medium throughout the 10 day exposure period.

Autoradiograms of freeze dried plant material indicated that root to foliar movement of ^{14}C-fluridone was much more extensive at 0.1 mg/L than at 0.5 mg/L. Each of 6 replicates root-exposed to 0.1 mg/L ^{14}C-fluridone showed evidence of herbicide movement throughout the plant with areas of greatest accumulation at the growing tips. Plants exposed to 0.5 mg/L fluridone produced an X-ray film image only in the portion directly exposed to herbicide and, in a few instances, 1 to 2 cm beyond. This evidence coupled with browning of the root area, would seem to indicate tissue damage and possible disruption of the translocation mechanism. (U.S. Department of Agriculture, SEA-AR, Aquatic Weed Research Lab, Denver, CO)

^{14}C - fluridone penetration of whole leaf sections of hydrilla. Anderson, L. W. J. and J. C. Pringle. Fluridone - ^{14}C labeled, at concentrations of 0.1 and 0.5 mg/L, was added to one side of a two-compartment partitioning apparatus in which a living hydrilla leaf section, 2 by 10 mm, served as a barrier to herbicide movement. Samples (0.1 ml) were taken from both treated and untreated compartments at intervals of 0.25, 0.5, 1, 2, 4, 6, 8, 24, 48, 72, and 96 hours following addition of fluridone. Each treatment rate was run in triplicate. Samples were assayed with a Beckman liquid scintillation counter and corrections were made for quench and instrument counting efficiency.

Through the 6-hour sampling interval, percent herbicide movement (untreated vs. treated compartments) was greater at the 0.1 mg/L treatment rate. However, from 48 through 96 hours, the 0.5 mg/L treatment resulted in a higher percentage movement with 36% compared to 30% for the 0.1 mg/L concentration. Similar whole leaf section treatments with simazine and atrazine produced 96 hour totals of only 5 and 5%, respectively. This contrasts with results obtained previously when isolated epidermal tissues of *Potamogeton nodosus* were used as the permeability barriers in which case triazine herbicide moved much more rapidly than did fluridone. (U.S. Department of Agriculture, SEA-AR, Aquatic Weed Research Lab, Denver, CO)

Effect of six hour exposures of Komeen and Aquathol-K on Elodea canadensis, Hydrilla verticillata and Myriophyllum spicatum in flowing water

Treatments:	Hydrilla		Elodea		Milfoil	
	1/ Visual rating	2/ fr.wt.(g)	Visual rating	fr.wt.(g)	Visual rating	fr.wt.(g)
Control	0	16.2±2.7	0	20.2±1.3	0	12.0±1.1
Aquathol K-0.5 ppm	2.4	8.9±1.4	2.9	9.5±2.2	1.25	8.0±1.8
Aquathol K-0.5 ppm +Komeen -0.5 ppm	4.8	5.3±1.1	5.8	2.3± .4	5.5	2.38± .5
Aquathol K-0.5 ppm +Komeen -1.0 ppm	4.8	6.4± .8	6.5	1.9± .6	5.5	2.1± .6
Aquathol K-0.5 ppm +Komeen -2.0 ppm	5.3	4.9± .1	6.9	2.8±1.1	6.6	2.35± .8
Komeen - 1.0 ppm	3.75	9.8±1.3	4.75	2.9± .9	4.83	2.6± .6
Komeen - 1.0 ppm +Aquathol K-0.25 ppm	3.25	12.2± .6	4.0	8.6± .9	4.66	5.7± .9
Komeen - 1.0 ppm +Aquathol K-0.5 ppm	4.08	11.3±3.9	4.33	7.2± .9	4.58	5.6± .3
Komeen - 1.0 ppm +Aquathol K-1.0 ppm	4.33	11.9±2.6	4.83	7.9±3.1	4.58	5.8± .2

1/ Zero = no effect; 10 = complete kill; average of 4 weekly observations.

2/ Mean ± S.E. 4 weeks after exposures to herbicides.

Response of Hydrilla verticillata, Elodea canadensis and Myriophyllum spicatum to combinations of Komeen and endothall in moving water. Anderson, L. W. J. and R. W. Raines. A 150 gal recirculating trough system was used to examine the effects of combinations of Komeen and Aquathol K on rooted cuttings of elodea, hydrilla and Eurasian watermilfoil under flowing conditions. Cuttings of plants that had been rooted for four weeks in 4 inch pots were exposed to varying concentrations of Komeen and Aquathol K® for 6 hrs. After exposure to herbicides, plants were removed from the trough, placed in 5 gal jars in fresh tap water and maintained under greenhouse conditions. Visual observations and phytotoxicity scoring were conducted on a weekly basis. In addition, after 4 weeks recovery, plants were removed and fresh weights were determined. Three sets of pots for each species were exposed for each of the combinations of treatments. Since the intent of the study was to determine the practicability of utilizing combinations of Komeen and endothall for the treatment of hydrilla in the Imperial Irrigation District, El Centro, CA, the water used for the 6 hr treatments was brought from El Centro in 30 gal plastic drums.

Results are shown in the following table. For all weed species, combinations of 0.5 ppm Aquathol K and Komeen at 1-2 ppm produced the most effective control during the 4 week observation. Visual observations correlated well with final fresh weights. It should be noted however, that even with the effective combinations of Aquathol K and Komeen, some re-growth of hydrilla was noted 2 to 3 weeks after treatment.

Evaluation of Komeen for aquatic weed control in ponds. Dechoretz, N. and R. T. Pine. Komeen was applied to ten ponds to determine the effectiveness of the herbicide on several aquatic weeds. Pond size, treatment rates, and weeds present prior to treatment are shown in the accompanying table. Komeen was applied to ponds 1, 2, and 7 through 10 by siphoning the toxicant into the water behind a motor driven boat. The treatment procedure for ponds 3 through 6 was different than that used in the other pond treatments. Since these ponds were small the herbicide was diluted in 5 gal of water and then sprayed from shore over the water surface.

American elodea, common coontail, southern naiad, horned pondweed, cladophora and chara were very sensitive to the herbicide. When applied at a rate of 0.5 ppmw or greater, Komeen completely controlled American elodea and common coontail after one week. Chara, southern naiad, and horned pondweed were controlled after two weeks. The other plant species were more tolerant to Komeen. Sago pondweed, curlyleaf pondweed, and Eurasian watermilfoil were controlled with Komeen at 1.0 ppmw. However, a period of three weeks after application was usually necessary before appreciable slumping occurred. Regrowth of these three species was rapid. Retreatment was generally required six weeks after the first treatment.

Anerican pondweed was the most tolerant species tested. With one exception, American pondweed was controlled at 2.0 ppmw. (U.S. Department of Agriculture SEA-AR, Botany Department, University of California, Davis, CA 95616)

Ponds treated with Komeen for the control of aquatic weeds

Pond Number	Surface area of pond	Average depth of pond	Concentration of copper ion	Weed species present in ponds
	A	ft	ppmw	
1	0.33	2.80	1.0	Sago pondweed, horned pondweed, chara, and cladophora.
2	0.41	2.70	1.0	Sago pondweed, curlyleaf pondweed, horned pond-weed, Eurasian watermil-foil, and southern naiad.
3	0.04	3.25	2.0	American pondweed, sago pondweed, American elodea, and Eurasian watermilfoil.
4	0.04	3.28	2.0	Same as Pond 3
5	0.04	3.42	1.0	Same as Pond 3
6	0.04	3.42	1.0	Same as Pond 3
7	1.30	8.50	1.0	Common coontail
8	2.50	8.00	0.5	Common coontail, American elodea, chara, and cladophora
9	2.50	9.00	0.5	Common coontail and sago pondweed
10	0.75	4.00	1.0	Southern naiad, sago pondweed, American pondweed, horned pondweed, and chara

Response of dwarf spikerush to several herbicides. Yeo, R. R. and J. R. Thurston . Dwarf spikerush is a short-growing aquatic weed competitor being studied for its efficacy as a biological weed control agent. Plantings of dwarf spikerush can be established more rapidly if the weed growth that is present can be suppressed. Consequently, seven herbicides that are used to suppress submersed waterweeds were evaluated for their phytotoxic effects on dwarf spikerush. The test was conducted in 20 L jars in the greenhouse under fluorescent lights emitting 185 microeinsteins at the water surface. A 10 by 10 cm plastic pot containing a dense growth of dwarf spikerush sod grown from tubers and a 10 by 10 cm plastic pot containing several shoots of sago pondweed were placed in each jar. The jars were filled with tap water. Controls consisted of three jars containing dwarf spikerush and sago pondweed with no treatment. The herbicides tested, and corresponding concentrations, are listed in the accompanying table. The degree of phytotoxicity was based on visual observations made after 4 weeks. A rating scale of 0 to 10 was used, 0 indicated no injury and 10 indicated dead plants.

The results showed that the herbicides that caused visual injury of 1 or less to dwarf spikerush and 5 or more to sago pondweed included: Komeen at 1 and 4 ppmw, diquat at 0.5 ppmw, mono (N,N-dimethylalkylamine) salt of endothall at 0.5 and 1.0 ppmw, grade B xylene at 210 ppmw, and acrolein at 0.5, 1.0, and 4.0 ppmw. Although copper sulfate pentahydrate did not kill the sago pondweed, the results indicated it would be safe to use for controlling algae in areas with dwarf spikerush. (U.S. Department of Agriculture, SEA-AR, Botany Department, University of California, Davis, CA 95616)

Response of dwarf spikerush and sago pondweed to various herbicides

Herbicide	Treatment rate (ppmw)	Plant response [a] Dwarf spikerush	Sago pondweed
Copper sulfate pentahydrate entahydrate	0.5	0.0 [b]	1.3
	1.0	0.3	2.7
	4.0	0.0	2.0
Komeen	0.5	0.0	2.3
	1.0	0.3	5.3
	4.0	0.7	5.0
Diquat	0.5	1.0	8.7
	1.0	3.7	9.7
	2.0	1.0	9.3
Dipotassium salt of endothall	0.5	0.7	3.3
	1.0	1.0	3.3
	3.0	1.0	4.7
Mono (N,N-dimethylakylamine) salt of endothall	0.5	1.0	5.0
	1.0	1.0	6.0
	3.0	1.7	7.7
Grade B xylene	210	0.6	8.7
	420	5.0	7.0
	840	7.7	8.0
Acrolein	0.5	0.0	3.7
	1.0	1.0	4.7
	4.0	1.0	4.7
Control	---	0.0	0.0

a/ Response of weeds based on 0 to 10 scale; 0= no response, 10= dead.

b/ Figures are final ratings at the end of four weeks.

Effect of dwarf spikerush on the growth and reproduction of aquatic weeds. Yeo, R. R. and J. R. Thurston. Tubers of dwarf spikerush were sown into established stands of American elodea, Nuttall's elodea, American pondweed, sago pondweed, horned pondweed, hydrilla, and Eurasian watermilfoil to determine the effect of dwarf spikerush plants on the growth of several species of rooted submersed aquatic weeds. The study was conducted in a shadehouse transmitting 45% of the incident sunlight. Three inches of Yolo clay loam soil were placed in ninety 75-L tanks and filled with tap water. The propagules or plant fragments of each weed species were planted in each of 12 tanks on May 1, 1979. One month later, after the weeds had become established, tubers of dwarf spikerush were sown in six tanks containing each weed species at the rate of 5 per in^2. Six tanks were planted to dwarf spikerush for control treatments. The effect due to the presence of dwarf spikerush was evaluated by counting the number of shoots of each aquatic weed species in each group of tanks with and without dwarf spikerush in October 1979.

Response of established macrophytes to the presence or absence of introduced dwarf spikerush

Aquatic weed species	Number of aquatic weed plant shoots	
	With spikerush	Without spikerush
American elodea	28.2	62.5
Nuttall's elodea	23.3	71.0
Horned pondweed	105.3	1204.3
Hydrilla	25.1	43.5
American pondweed	42.0	73.3
Sago pondweed	65.0	109.4
Eurasian watermilfoil	11.3	9.5

The results are summarized in the above table. Aquatic weed species planted with dwarf spikerush consistently resulted in fewer numbers of shoots, except Eurasian watermilfoil. Eurasian watermilfoil had more shoots when grown with dwarf spikerush, probably the result of stem fragmentation. The study will be terminated in 1980. (U.S. Department of Agriculture, SEA-AR, Botany Department, University of California, Davis, CA 95616).

Control of submersed aquatic weeds in irrigation canals with fluridone. Dechoretz, N. and R. T. Pine. Most irrigation canals in the western states are drained at the end of the growing season. Last year, during this dewatered period, 36 experimental plots were treated (16 in December and 20 in March) to determine whether fluridone, when applied to the soil as a preemergence treatment, would control aquatic weeds during the following irrigation season. Both the aqueous suspension (4AS) and pelleted preparation (5P) of fluridone were applied at a rate of 4 and 8 lb/A. Of the 16 plots treated in December, 8 were raked clean of plant material or debris prior to treatment and the other 8 were left untouched. The same procedure was employed for the remaining 20 plots established in March. Although there was some variations in the soil texture between the plots (55 to 75% clay, 15 to 35% silt, 0 to 25% sand and 1.5 to 7.0% organic matter), the treated soils were classified as clay. Monthly observations were conducted during the irrigation season to evaluate the accumulative effects of the herbicide treatments.

Fluridone gave better aquatic weed control when it was applied in December. The results of these treatments are shown in Tables 1 and 2. Fluridone was more effective when applied to raked soil than when applied to unraked soil. In the unraked plots fluridone 5P applied at 8.0 lb/A gave effective aquatic weed control throughout the entire irrigation season. The 5P preparation provided control over a longer period of time than did the 4AS preparation. This occurred whether the plots were raked or unraked prior to treatment.

Except for one group of four raked plots treated with fluridone 5P, the March applications of fluridone did not inhibit the growth of aquatic weeds during the irrigation season. This lack of control may have been related to the amount of rainfall deposited on the treated area after application and before the water was turned into the canal. The plots planted in December received 15 in of rain while the March plots received only 2 in of rain prior to irrigation. Two inches of precipitation may not have been sufficient to carry the herbicide into the soil profile where it would be available for root absorption. The four treatment plots in March that exhibited control had standing water in the canal for a period of 2 weeks following a severe rainstorm. This moisture may have enhanced the release of fluridone from the pellet and increased its movement into the hydrosoil. (U. S. Department of Agriculture SEA-AR, Botany Department, University of California, Davis, CA 95616)

Table 1. Control of waterweeds in the Byrnes Canal after an application of fluridone made in December.

Treatment & preparation	Rate (lb/A)	Percent Control[a] July	August	September
		Raked		
Fluridone 5P	4	90-100	90-100	90-100
	8	95-100	90-100	90-100
Fluridone 4AS	4	90-100	90-100	75-100
	8	90-100	90-100	50-50
		Unraked		
Fluridone 5P	4	65-100	65-100	50-0
	8	75-100	75-100	75-100
Fluridone 4AS	4	50-0	50-0	0-0
	8	50-50	50-50	30-50

a/ The first figure represents percent bare hydrosoil; the second figure indicates the percent stunting of the remaining plant growth.

Table 2. Control of waterweeds in the Dally Canal after an application of fluridone made in December.

Treatment & preparation	Rate (lb/A)	Percent Control[a] July	August	September
		Raked		
Fluridone 5P	4	75-100	75-100	50-100
	8	100-0	95-100	75-100
Fluridone 4AS	4	50-100	25-100	25-100
	8	95-100	85-100	0-75
		Unraked		
Fluridone 5P	4	50-50	25-50	0-50
	8	90-100	90-100	50-100
Fluridone 4AS	4	25-50	25-50	25-50
	8	50-100	0-0	0-0

a/ The first figure represents percent bare hydrosoil; the second figure indicates the percent stunting of the remaining plant growth.

Effects of glyphosate and other herbicides on willows in northern New Mexico. Dickerson, George W. Willows are a frequent brush problem occurring along the waterways and in irrigated pastures in northern New Mexico. Regrowth often occurs the following years after the application of phenoxy herbicides like 2,4-D. As runoff from these pastures is often used for crop irrigation, safer herbicides must be found to control this pest. Glyphosate, a herbicide found effective in controlling perennial weeds such as Johnsongrass and bindweed, is readily deactivated when it comes in contact with the soil. This experiment was conducted to compare the effects of glyphosate and various phenoxy herbicides on willows.

In late July and early August of 1977, various herbicides were applied to willows at three locations in northern New Mexico (Rio Arriba, Santa Fe, and San Miguel counties). The experiment was set up in a random block design with three replications, with one replication per county. Individual treatment plots averaged 16.2m^2 in size. Sites were located along irrigation or drainage systems servicing pastures in the areas. Soils ranged from gravelly to sandy or sandy loams.

The foliage was thoroughly wetted with the chemicals, which were applied with a small, gasoline-powered sprayer and handgun. Exact rates of chemical per hectare varied as only the foliage of the willows was sprayed and the density of the stands varied. Chemicals included silvex(ester), 2,4,5-T(LVE), and various rates of 2,4-D(ester), glyphosate and their mixtures (Table). Each plot in each replication was visually evaluated for top kill (1977) and total kill (1978) and given a rank of 1 (0% kill) to 13 (100% kill). The three replications were added together for each treatment and a Chi Square analysis was run on the data using Friedman's Procedure (Steele and Torrie, 1960, Prin. and Proc. of Statistics, p. 403).

In the fall of 1977, all the phenoxy chemicals seemed to give a relatively quick top kill as compared to the glyphosate treatments by themselves (Table). The mixtures of 2,4-D and glyphosate seemed to give the quickest top kills, possibly due to some synergetic effect. The glyphosate treatments alone seemed to be very slow in acting on the plants.

The following summer, glyphosate at 0.90 kg ai/190 l H_2O was found to give 100% kill of the entire plants at each location. This was significantly better (LSD.05) than any of the phenoxy compounds by themselves. There were no significant differences between it and the other glyphosate treatments. Glyphosate at 0.45 kg was found to give a significantly better kill than 2,4-D at the same rate or silvex at twice the rate. No significant differences were noted between the mixtures of 2,4-D and glyphosate and glyphosate at the same rate by itself (0.11 kg). Thus it is not known whether any synergetic effects actually occurred. All of the glyphosate treatments showed a significantly better kill than the check. There were no significant differences between the check and any of the phenoxy treatments, except those mixed with glyphosate.

Though relatively expensive at present, glyphosate could prove to be one of the better herbicides for willow control in thr future. Its relatively safe impact on the environment also warrants that more research be done evaluating the effects of this herbicide on willows and other brush species. (Dept. of Agricultural Services, New Mexico State University, Las Cruces, New Mexico 88003).

Table Effects of various rates of herbicides on top and total kill of willows in northern New Mexico, 1977-1978

Chemical	Rate Kg ai/190 l H_2O	Ranking[1/] Top kill (1977)	Ranking[1/] Total kill (1978)	% Total Kill (1978)
Glyphosate	0.90	22	38a[2/]	100
Glyphosate	0.45	20	37ab	98
Glyphosate	0.22	15	32abc	91
2,4-D + Glyphosate	0.22 + 0.11	27	31abcd	90
2,4-D + Glyphosate	0.11 + 0.11	27	26abcd	84
Glyphosate	0.11	15	25abcd	82
2,4,5-T	0.90	27	19bcde	70
2,4-D	0.90	27	19bcde	63
Silvex	0.90	27	14cde	40
2,4-D	0.45	27	13de	43
2,4-D	0.22	22	11de	30
2,4-D	0.11	15	6e	17
Check	----	3	3e	0

[1/] Highest numbers in each column represent best kill (total rank of three blocks)

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

Response of blue vervain to four foliage-applied herbicides. McHenry, W.B., N.L. Smith, C.B. Wilson and L. Buschmann. Blue vervain is a tall (3 to 6 ft.), perennial weed that is occasionally found in non-crop areas of the Sacramento valley. Research on the response of this species to herbicides has been limited. A Sutter County roadside was selected to evaluate the efficacy of 2,4-D oil soluble amine, amitrole, MSMA and glyphosate applications. Herbicides were applied August 10, 1978 to 10 by 20 ft. plots using a backpack CO_2 sprayer. A spray volume of 100 GPA was utilized with the exception of glyphosate which was applied in 40 GPA. A surfactant (X-77) at 0.5% v/v was included with amitrole and MSMA. Vervain was at 85% full bloom with an occasional new shoot emerging. An evaluation on June 26, 1979, indicated that excellent control could be achieved with 2,4-D oil soluble amine at 4 lb ai/A. Glyphosate offered only marginal control at the highest rate tested. Little effect was noted from either amitrole or MSMA. (University of California Cooperative Extension, Davis, CA 95616 and Yuba City, CA 95991)

Blue vervain control

Herbicide	ai/A	Control June 26, 1979[1/]
2,4-D o.s. amine	2	7.3
2,4-D o.s. amine	4	9.6
amitrole	2	0.3
amitrole	4	0
MSMA	4	1.3
glyphosate	1	0.8
glyphosate	2	2.0
glyphosate	4	5.8
control	-	0

1/ Average of 4 replications

Control of annual weeds with several soil active herbicides. McHenry, W.B. and N.L. Smith. A colusa County roadside was selected as a site to compare several relatively new soil-active herbicides with atrazine for the control of general annual weeds. Herbicides were applied February 26, 1975 to 10 ft. by 12 ft. plots utilizing a CO_2 backpack sprayer. Spray volume was 40 GPA and four replications were employed. Amitrole was included alone and in combination with the soil-active herbicides for the control of existing weed growth. Precipitation totaled 5 inches following application the first season, February 26, 1975 to June 30, 1975. An additionl 6 inches was recorded the 1975-1976 season prior to an evaluation May 13, 1976. The 1976-1977 rainfall season produced an additional 8 inches of precipitation. A total of 18 inches of rainfall for the year was recorded when an evaluation was made June 22, 1977. Acceptable control was observed from all soil-active herbicides; metribuzin appeared to exhibit the lowest level of activity, and hexazinone appeared weak on hood canarygrass. Herbicide effectiveness was considerably reduced the second year with the exception of tebuthiuron which was still exhibiting excellent control of annual weeds. It appears that tebuthiuron offers excellent potential for long term residual control of annual weeds. (University of California Cooperative Extension, Davis, CA 95616)

Annual weed control

Herbicide	Ai/A	Control* (10 = 100%) May 13, 1976	June 22, 1977
atrazine	2	9.7	3.9
atrazine	4	9.9	6.7
Bay Met 1486	2	7.2	3.9
Bay Met 1486	4	9.6	8.5
metribuzin	2	6.3	0.6
metribuzin	4	7.5	4.7
tebuthiuron	2	9.9	9.9
tebuthiuron	4	9.9	9.9
VEL 5026	2	8.6	3.7
VEL 5026	4	9.7	7.6
hexazinone	2	8.4	4.5
hexazinone	4	8.9	6.0
amitrole	1	3.3	0
control	-	0	0

* Weed Spectrum

alkali clover	red orach
hood canarygrass	ryegrass

Dicamba residues in crops irrigated with water containing low levels of Banvel 4S® herbicide. Anderson, L. W. J. In order to determine the potential use of dicamba as a irrigation ditchbank herbicide, six crops were grown and irrigated once with either 0.05 or 0.5 ppmw dicamba by furrow or sprinkler applications. Irrigations with water containing herbicide were made at the time of flower formation. Treatments for sprinkler or furrow irrigation were made in four replicates. Approximately two inches of water were applied during each irrigation treatment with dicamba. Crop samples were taken at the following times:

a. within 24 hrs of treatment

b. 21 days post-treatment

c. 39 days post-treatment

Crop samples were analyzed by Velsicol Chemical Company for content of dicamba and the metabolite 5 hydroxy dicamba, by gas chromatographic methods.

Phytotoxicity to crops was only observed with the high rates (0.5 ppmw), but in no crops with the 0.05 ppmw treatments. At the low rate of application in furrow irrigation, dicamba residues were only detected in alfalfa samples at 24 hr and 21 day sampling periods, but these levels averaged only 0.05 and 0.007 ppmw respectively. Extremely low levels (0.006, 0.007 ppmw) were observed in furrow-irrigated field corn foliage, 21 and 39 days' post-treatment. Residues of dicamba were observed in all sprinkler-irrigated crops except cucumbers and sugarbeet root following treatment with 0.05 ppmw dicamba. For example, levels in tomatoes and sugarbeet leaves and pinto beans were in the range of .0065 to .01 ppmw.

Residues of dicamba were detected in all crops, except corn foliage and tomatoes, in furrow and sprinkler irrigation treatments with the high rate of exposure (0.5 ppm dicamba). Highest residues were observed in field corn kernel (1.01 ppmw), pinto beans (0.65 ppmw), following sprinkler irrigation. With furrow application, highest residues were obtained in pinto beans (0.19 ppmw), and the lowest in sugar beet root (0.02 ppmw). No residues of 5 hydroxy dicamba were detected in crops treated with .05 ppmw dicamba during sprinkler or furrow irrigation. The high treatment (0.5 ppmw) by furrow or sprinkler application resulted in residues of 5 hydroxy dicamba at levels comparable to that of dicamba itself in field corn foliage.

The above results indicate that when dicamba is present in irrigation water during one-time exposures, levels at .05 ppmw or below will most likely not result in phytotoxicity to crops nor in levels which exceed established tolerances for dicamba. (U.S. Department of Agriculture, SEA-AR, Aquatic Weed Research Lab, Denver, CO)

Russian thistle control with several soil active herbicides. McHenry, W.B. and N.L. Smith. This experiment was initiated on the Davis campus experimental farm March 9, 1979, along a fenceline that has a history of Russian thistle. Previous years weed growth had been flailed and burned off prior to herbicide application. Bromacil, hexazinone, tebuthiuron, karbutilate and metribuzine were applied at 1 and 2 lb ai/A; fluridone was applied at 1/4 and 1/2 lbs ai/A. Amitole at 1 lb ai/A was applied to all plots. Three replications were employed utilizing a spray volume of 40 GPA. Plot size was 8 by 14 ft. A total of 3 inches of precipitation was recorded between applications and evaluation. Effective control of Russian thistle was achieved with all soil-active herbicides tested. Fluridone was somewhat weaker on other general annual weeds. (University of California Cooperative Extension, Davis, CA 95616)

Six soil active herbicides for Russian thistle control

		Control July 2, 1979	
Herbicide	ai/acre	Russian thistle	Other annual Weeds
bromacil + amitrole	1 + 1	9.7	9.7
bromacil + amitrole	2 + 1	10.0	10.0
hexazinone + amitrole	1 + 1	9.3	9.0
hexazinone + amitrole	2 + 1	10.0	10.0
tebuthiuron + amitrole	1 + 1	8.4	9.0
tebuthiuron + amitrole	2 + 1	10.0	10.0
karbutilate + amitrole	1 + 1	9.0	8.3
karbutilate + amitrole	2 + 1	10.0	10.0
fluridone + amitrole	0.25 + 1	7.3	5.3
fluridone + amitrole	0.5 + 1	10.0	8.2
metribuzin + amitrole	1 + 1	10.0	9.3
metribuzin + amitrole	2 + 1	10.0	10.0
amitrole	1	0.5	2.3

PROJECT 7

CHEMICAL AND PHYSIOLOGICAL STUDIES

J. Wayne Whitworth - Project Chairman

SUMMARY -

Only two papers were received under this project.

Picloram and 2,4-D appeared to increase the sensitivity of wheat plants to powdery mildew.

Purple and yellow nutsedge plants rapidly metabolized metolachlor and there were differences in the metabolites of the two species which may be related to their differential response to this herbicide.

Influence of picloram and 2,4-D on sensitivity of wheat to powdery mildew. Muzik, T. J. Soil applications of 2,4-D or picloram were made to 10 week old Nugaines wheat plants in the greenhouse. Rates used were 1 and 2 lb per acre of each chemical. Plants were grown in individual pots in a sandy loam soil. There were 8 plants per treatment. All plants were dusted with powdery mildew at the time of herbicide application. The number of leaves with mildew lesions was counted 10 days later. The plants were harvested at 21 days and dry weights measured. Both picloram and 2,4-D apparently increased the sensitivity of the wheat leaves to powdery mildew. Growth of the 2,4-D treated plants was not significantly affected. (Washington State Agricultural Experiment Station, Pullman, WA 99164).

INCIDENCE OF POWDERY MILDEW INFESTATION

Treatment	Rate/A	Number of Leaves Affected	Dry Weight Per Plant
Control	0	3	14.0
2,4-D	1	47	13.0
2,4-D	2	50	11.0
Picloram	1	40	8.5
Picloram	2	50	9.5

Metabolism of metolachlor by nutsedges. Buckwalter, H.G., R. Turner, and J. W. Whitworth. Metolachlor has given excellent control of yellow nutsedge (*Cyperus esculentus*) under certain conditions, but has been relatively ineffective on purple (*C. rotundus*). Preliminary investigations indicated a very rapid metabolism of metolachlor by both species. A methanol mixture of 116.72 g of metolachlor per l was prepared and 0.5 ml added to each sample of air dried and ground tubers and leaves. An analysis of the samples by gas chromatography using flame ionization detection with nitrogen as the carrier indicated rapid disappearance of the added metolachlor.

In further investigations, tubers of both species of nutsedge were planted in a sandy clay loam soil (pH 7.7, O.M. 0.49%) containing four different rates of metolachlor (0, 3, 6 and 12 lb/A) incorporated to a depth of 3 in. The tubers were washed in warm water to speed germination and placed at a depth of 0.5 in into the treated soil. Five to ten tubers of each nutsedge species were removed from the treated soil after 5, 25 and 125 hr of exposure. Only metabolites were found in both species at all time intervals tested indicating that 100 percent of the metolachlor that was taken up was rapidly metabolized into polar compounds. There is evidence that the metabolites of metolachlor from the yellow and purple nutsedge plants are different; the nature and properties of them are still under study. (Agronomy Department, New Mexico State University, Las Cruces, N.M. 88003).

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

AUTHOR INDEX

CROPS INDEX

CROPS INDEX (continued)

HERBACEOUS WEED INDEX

(alphabetically by scientific name)

HERBACEOUS WEED INDEX

(alphabetically by common name)

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 metnion 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.

WOODY PLANT INDEX

(other than ornamentals)