Western Society of Weed Science

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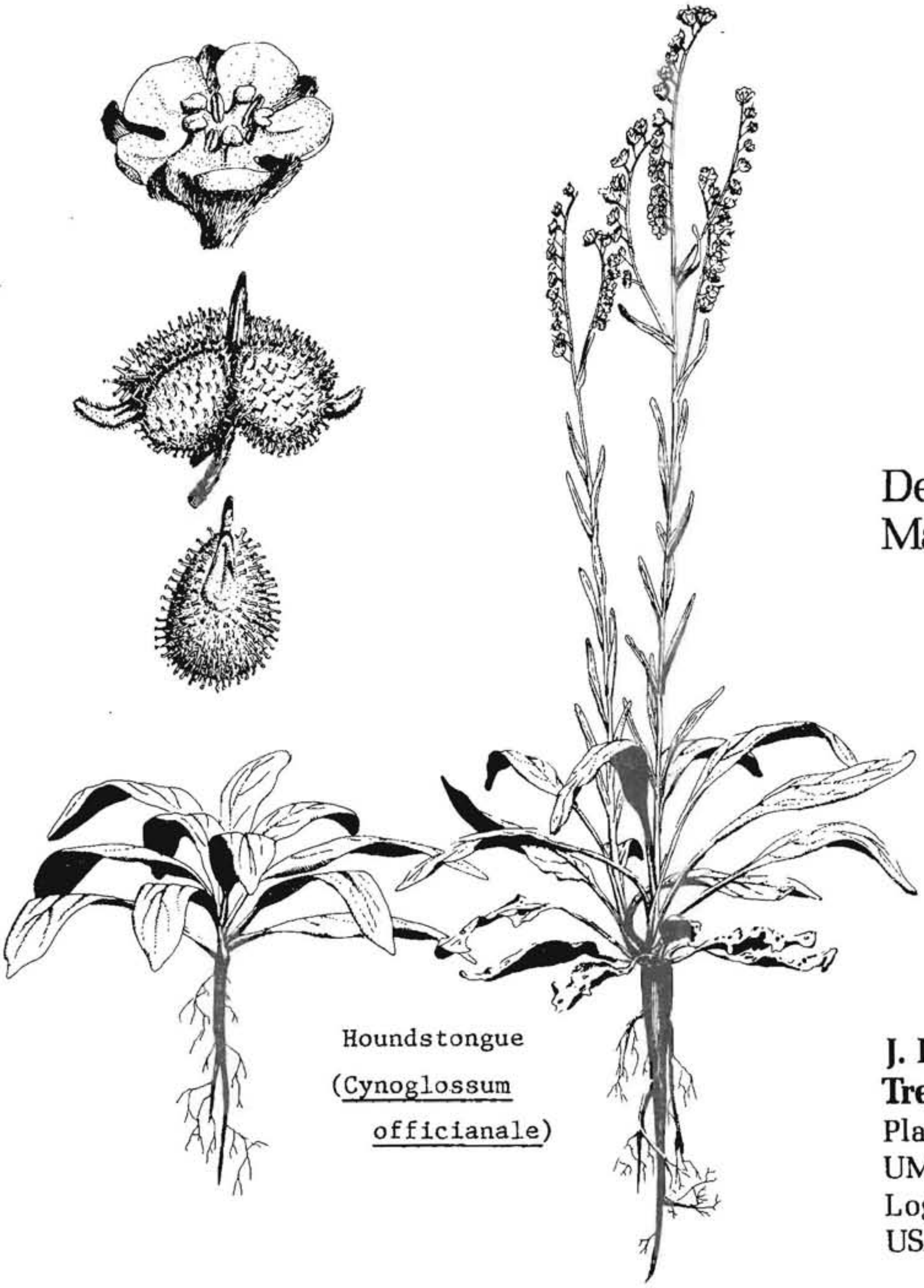

Houndstongue (Cynoglossum officianale)

Denver, Colorado
March 9, 10, 11, 1982

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FOREWORD

The Western Society of Weed Science 1982 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 weed science community; it is not meant to serve as a means of presenting conclusions, endorsements or recommendations to the general public or anyone else. In this report, information contained herein is meant to be considered in a preliminary sense, and NOT FOR PUBLICATION. This represents an effort by the WSWS to make available effective research, improve communication among scientists having common interests, minimize duplication of effort, and to promote a sharing of ideas.

This 1982 Western Society of Weed Science Research Progress Report is prepared by photoreproduction of the reports as submitted by the authors, without retyping or significant editorial changes. Content, format and style of each paper or report are the sole responsibility of the author(s). In the interest of information exchange, reports were accepted for printing except for profound deviations from WSWS editorial rules.

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

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

Peter K. Fay
Chairman, Research Section
Western Society of Weed Science
1982

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PROJECT 1.

PERENNIAL HERBACEOUS WEEDS

Gus Foster - Project Chairman

Comparison of chlorsulfuron and Dowco 290 for control of Canada thistle in smooth bromegrass pasture. Alley, H. P., N. E. Humburg and R. E. Vore. Various rates of chlorsulfuron and Dowco 290 were applied to a Canada thistle infestation growing in a smooth bromegrass pasture to compare their effectiveness to control the weed and evaluate their phytotoxicity to the grass growing in association with the thistle.

The plots were established June 17, 1980, to Canada thistle which had been mowed and had 4 to 6 inches regrowth at time of treatment. Plots were 9 by 30 ft arranged in a randomized complete block with three replications. All treatments were applied with a 6-nozzle knapsack unit in a total volume of 40 gpa solution.

Visual estimates and Canada thistle shoot counts were made on June 24, 1981, approximately one year following application. Visual estimates and shoot counts were comparable. Chlorsulfuron gave 88 to 100% control of the Canada thistle shoots, with rates ranging from 0.062 to 0.25 lb ai/A resulting in 98 to 100% shoot control. Dowco 290 at 0.5 lb ai/A was comparable to the light rates of chlorsulfuron.

Chlorsulfuron at application rates in excess of 0.125 lb ai/A and Dowco 290 at 0.5 lb ai/A reduced the smooth bromegrass stand from 30 to 50%. (Wyoming Agric. Exp. Sta Laramie 82071, SR 1135).

Canada thistle shoot control

Treatment	Rate lb ai/A	Percent control Visual	counts	Observations
chlorsulfuron	0.0156	92	88	Smooth bromegrass stand reduced by 30 to 50% by rates of chlorsulfuron in excess of 0.125 lb ai/A and Dowco 290 at 0.5 lb ai/A.
chlorsulfuron	0.062	96	98	
chlorsulfuron	0.125	98	99	
chlorsulfuron	0.25	100	100	
Dowco 290 (M 3972)	0.25	63	50	
Dowco 290 (M 3972)	0.5	81	98	
Check	--	0	0	
Canada thistle shoots/sq ft		*3.85*		

Control of purple nutsedge (*Cyperus rotundus* L.) during a summer fallow period. Bell, C. E. and A. Durazo III. Management of purple nutsedge during a summer fallow period was studied using various herbicides and application methods. Three herbicides were evaluated; glyphosate (N-(phosphonomethyl) glycine), bentazon (3-isopropyl-1H-2,1,3-benzothiadiazin-4(3H)-one 2, 2-dioxide) and MSMA (Monosodium methanearsonate). Each herbicide was applied at recommended label rates for control of purple nutsedge at a growth stage just prior to flowering in a conventional CO_2 pressurized plot sprayer at 32 gallons per acre of water. Bentazon was applied at 1 lb ai/A, MSMA at 2 lb ai/A and glyphosate at 2.25 lb ae/A. In addition, glyphosate was applied at 2.25 lb ae/A and at 1.125 lb ae/A using a controlled droplet applicator (CDA) Micron Herbie at 4.8 GPA of water.

The trial area was disked, bordered then flooded three weeks prior to application. Plot size was 8 ft. by 25 ft. and replicated 4 times in a randomized complete block design. Treatment area was a band 48 inches wide through each plot. The results are presented in the following table. (University of California Cooperative Extension, El Centro, CA. 92243).

Treatment	Rate/acre	Application (gpa)	% Control of purple nutsedge
Glyphosate	2.25 lb ae	32	62.5
Glyphosate	2.25 lb ae	4.8	82.5
Glyphosate	1.125 lb ae	4.8	80
Bentazon	1.0 lb ai	32	40
MSMA	2.0 lb ai	32	60
Untreated Control			0

Control of yellow starthistle with bromoxynil. Vandepeute, J. Yellow starthistle (Centaurea solstitialis L.) is a costly weed pest that has invaded grassland valleys in California, Washington, Oregon and Idaho. There are nearly 2 million acres of pasture and rangeland affected by starthistle in California alone. Starthistle invades an area and crowds out other plants by its hardiness and also by exuding a chemical that suppresses growth of other neighboring plants through allelopathy. The sharp spines on the flower heads interfere with efficient grazing by livestock on dryland pastures. In addition horses consuming the plant can become afflicted with "chewing disease" which attacks the nervous system.

This is a progress report on the use of bromoxynil as a control method. Bromoxynil is a contact herbicide active against a wide range of annual broadleaved weeds at doses from 0.15 lb ai/A. At the biochemical level, bromoxynil inhibits the second light reaction of photosyntheses and also uncouples oxidative phosphorylation of respiration. Bromoxynil can be safely applied for selective weed control in graminaceous crops against young seedlings of members of the Polygonaceae, certain Boraginaceae and Compositae.

The usefulness of bromoxynil to control yellow starthistle in small grain crops is already established. The objective of current testing is to emphasize that yellow starthistle is sensitive to bromoxynil even in the flowering stage of the plant. Amitrole® and 2,4-D are effective when applied to young plants through the early rosette stage, but once the flower-bearing stems or stalks appear, this weed becomes increasingly resistant to 2,4-D. More than one application of these herbicides may be necessary to achieve season long control. In studies performed in several Sacramento County locations, complete control of yellow starthistle was achieved with bromoxynil at 1 lb ai/A. Single applications were made using a small-plot backpack type sprayer calibrated to deliver 34 gallons of spray solution per acre from a six foot boom. The plot size was 6 ft. by 20 ft. Replicated tests were initiated from June to August in noncrop sites where yellow starthistle was the major weed species present. In the first test the plants were beginning their rapid upward growth. In this test best results were obtained, and no starthistle was alive for the rest of the summer. In later applications skeletonized plants remained in the test site but no regrowth was noted. Buctril® is not currently registered for this use. (Rhone-Poulenc Chemical Company, P.O. Box 5416, Fresno, CA 93755)

Effectiveness of triclopyr for the control of leafy spurge during the treatment year Krall, J. M. and E. I. Hackett A trial was established in Elko County, Nevada to evaluate triclopyr for the control of leafy spurge in a grass pasture. Sequential applications were made May 22, 1981 at the bloom stage of leafy spurge and June 29, 1981 at leafy spurge seed formation. All treatments were made using a 4-nozzle backpack sprayer which delivered 22 gal of spray volume/A. Each treatment was replicated 3 times in randomized complete-block design. Individual plot area was 6 ft by 30 ft.

Visual observations were made September 10, 1981. No damage to pasture grass was observed in any of the treatments. All treatments caused leafy spurge foliage to die back. Assessment of effectiveness of treatment was measured by leafy spurge regrowth. Triclopyr at low rates and repeat applications showed promise the initial year of treatment. Two 1/4 lb ai/A applications provided the lowest regrowth recovery of all treatments. (Integrated Pest Management Division, College of Agriculture, University of Nevada-Reno, Reno, Nevada 89557).

Leafy spurge regrowth following treatments of triclopyr

Treatment	Rate lb. ai/A	Percent regrowth leafy spurge
Triclopyr	0.25[1] and 0.25[2]	28
Triclopyr	0.37 and 0.37	38
Triclopyr	0.50 and 0.50	43
Triclopyr	3.00	60

1 applied May 22, 1981 at bloom stage of leafy spurge
2 applied June 29, 1981 at leafy spurge seed formation

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

Original treatments were made May 25, 1978, when the leafy spurge was in the pre-bud to bloom stage of growth. Liquid formulations were applied with a garden tractor mounted spray unit delivering 128 gpa water carrier. The granule formulation was applied with a hand operated centrifugal broadcaster. The first retreatments were made June 21, 1979, when the leafy spurge was in the pre-bud to bloom stage of growth, 8 to 14 inches high. Applications were made with a truck mounted spray unit delivering 32 gpa water carrier. The second retreatments were made May 13, 1980, when the leafy spurge was in the bud to flower stage of growth, 8 to 12 inches high. Applications were made with a truck mounted spray unit delivering 40 gpa water carrier. Plots were 11 ft by 22 ft arranged in a split block design with 2 replications. Soil was classified as a sandy loam (65.4% sand, 23.2% silt, 11.4% clay, 1.5% organic matter, pH of 7.7).

Shoot counts were made on May 20, 1981, to evaluate top growth control. Picloram K salt at 2.0 lb ai/A was the only original treatment maintaining 90% top growth control, 36 months after treatment. At this time, picloram K salt at 1.0 lb ai/A, picloram 2% granule at 2.0 lb ai/A and picloram K salt/2,4-D at 2.0 + 4.0 lb ai/A was providing 84, 83 and 87% top growth control, respectively. Dicamba 4L at 8.0 lb ai/A was maintaining 77% top growth control.

Retreatment of picloram K salt at 0.5 lb ai/A, applied over all original treatments, maintained 96 to 100% top growth control. Picloram K salt at 1.0 lb ai/A as a retreatment maintained 98 to 100% top growth control. All other retreatments improved top growth control provided by original treatments with control being dependent upon the capacity of the combination to suppress leafy spurge regrowth. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1121).

Leafy spurge shoot control

Original treatment lb ai/A	Percent shoot control					
	Retreatment, lb ai/A					
	picloram K salt 0.5	picloram K salt 1.0	dicamba 4L 2.0	2,4-D amine 2.0	dicamba 4L 1.0 2,4-D amine 2.0	Check
picloram (K salt) 2.0	100	100	96	93	95	90
picloram (K salt) 1.0	99	100	90	84	89	84
picloram (K salt) 0.5	99	100	79	80	77	29
picloram (2% beads) 2.0	99	100	98	90	87	83
picloram (2% beads) 1.0	99	99	82	92	82	68
picloram (2% beads) 0.5	100	100	77	76	78	36
picloram/2,4-D (amine) 2.0 + 4.0	99	100	95	90	89	87
picloram/2,4-D (amine) 1.0 + 2.0	98	100	89	76	64	31
picloram/2 4-D (amine) 0.5 + 1.0	96	100	65	66	73	0
dicamba 4L 8.0	96	98	87	82	94	77
dicamba 4L 4.0	97	100	84	69	83	24
Check	99	100	85	58	63	20 shoots/ sq ft

Evaluation of original treatment effect on leafy spurge live shoot regrowth. Vore, R. E., H. P. Alley and N. E. Humburg. Liquid and granule formulations of dicamba and picloram were evaluated for efficacy of controlling leafy spurge.

Plots were established May 15, 1980, to leafy spurge in the pre-bud to full flower growth stage, 4 to 14 inches tall. Liquid formulations were applied with a truck mounted sprayer using 29 gpa water carrier; granules were applied with a hand operated centrifugal broadcaster. Plots were 21.5 ft by 258 ft in a completely random design with 1 replication. Soil was a sandy loam (55.4% sand, 32.2% silt, 12.4% clay, 0.6% organic matter, pH 7.8).

Shoot counts were taken May 19, 1981, and revealed dicamba, regardless of formulation, at 8.0 lb ai/A provided 19 to 20% better top growth control than did dicamba at 6.0 lb ai/A. Dicamba 5G was slightly more effective than dicamba 4L. Little difference in top growth control was noted between the 1.0 and 2.0 lb ai/A rates of picloram with both the liquid and granule formulations being equally effective. There was no apparent damage to the grass in the experimental area. However, more prostrate grass growth was noted in the treatment areas than in the check. Also, grass was green longer in treatment areas than in the check. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1123).

Leafy spurge shoot control

Treatment	Rate lb ai/A	Percent Control
dicamba 4L	6.0	74
dicamba 4L	8.0	94
dicamba 5G	6.0	80
dicamba 5G	8.0	99
picloram (K salt)	1.0	99
picloram (K salt)	2.0	100
picloram (2% pellet)	1.0	99
picloram (2% pellet)	2.0	100
Check	--	20 shoots/sq ft

Evaluation of original treatment effect on leafy spurge live shoot regrowth. Vore, R. E., H. P. Alley and N. E. Humburg. Granule formulations of dicamba and picloram were evaluated for their effectiveness of controlling leafy spurge.

Treatments were made May 29, 1980, to leafy spurge in the pre-bud to full flower growth stages, 4 to 24 inches high. Applications were made with a hand operated centrifugal broadcaster. Plots were 80 ft by 100 ft in a block design with 1 replication. Soil was a silty loam (31.4% sand, 62.2% silt, 6.4% clay, 2.8% organic matter, pH 7.6).

Shoot counts were made June 2, 1981, and percent control was computed as a comparison to the check. Dicamba 5G at 6.0 and 8.0 lb ai/A provided 76 and 70% control, respectively. Picloram 2% pellets at 1.0 and 2.0 lb ai/A each provided 99% control. No grass damage was observed, one year after treatment. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1125)

Leafy spurge shoot control

Treatment	Rate lb ai/A	Percent control
dicamba 5G	6.0	76
dicamba 5G	8.0	70
picloram (2% pellet)	1.0	99
picloram (2% pellet)	2.0	99
Check	--	10.9 shoots/sq ft

<u>Evaluation of spring vs. fall applied original treatments as affecting leafy spurge live shoot regrowth.</u> Vore, R. E., H. P. Alley and N. E. Humburg. This experiment was established to compare efficacy of spring and fall applications of liquid and granule formulations of dicamba and picloram. Information is needed to support treatment selection for leafy spurge control programs on pasture and rangeland sites.

Spring treatments were made May 23, 1980, when the leafy spurge was in bud to full flower stage of growth, 4 to 18 inches tall. Fall treatments were made September 19, 1980, when the leafy spurge was mature, 14 to 16 inches tall. Liquid formulations were applied with a truck mounted spray unit using 25 gpa water carrier. Granule formulations were applied with a hand operated centrifugal broadcaster. Plots were 21.5 ft by 258 ft arranged in a completely random design with 2 replications. Soil was a sandy loam (72.4% sand, 15.2% silt, 12.4% clay, 1.3% organic matter, pH 7.6).

Shoot counts were made May 27, 1981, and percent control was computed as a comparison to the check. Dicamba 4L was more effective as a spring application than a fall application. Dicamba 5G was slightly more effective as a spring application than a fall application. Picloram (K salt) was equally effective as a spring or fall application while picloram 2% pellets was more effective as a fall application than a spring application. There was little apparent grass cover noted in the plot area at the time the experiment was established. However, by September 1981, grass in the treatment areas was still green and was 20 to 24 inches high. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1124)

Leafy spurge shoot control

Treatment	Rate lb ai/A	Percent Control	
		Spring	Fall
dicamba 4L	6.0	92	70
dicamba 4L	8.0	95	83
dicamba 5G	6.0	92	89
dicamba 5G	8.0	95	93
picloram (K salt)	1.0	96	95
picloram (K salt)	2.0	99	99
picloram (2% pellet)	1.0	93	99
picloram (2% pellet)	2.0	95	99
Check	--	19.8 shoots/sq ft	19.4 shoots/sq ft

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

Plots were established May 25, 1978, with liquid formulations being applied in 128 gpa water carrier with a garden tractor mounted sprayer. Granules were applied with a hand operated centrifugal broadcaster. Plots were 11 ft by 22 ft arranged in a split block design with 2 replications. Annual average precipitation at the nearest recording station is 16.7 inches. Grass and grass-like species in the plot area were thread-leaved sedge, Kentucky bluegrass, western wheatgrass, blue grama grass, Japanese brome and downy brome. Plots were hand clipped on June 30, 1979, July 29, 1980, and July 24, 1981. Four 2.5 ft diameter quadrat areas were clipped per treatment area from which pounds air-dry forage/A (12% moisture) was determined and average production computed. Species were not separated as total forage production measurement was desired.

Average total forage production in all treatment areas was from 290 to 862 lbs air-dry forage/A greater than that in the leafy spurge infestation (check) which averaged 451 lb/A. Plots treated with 2.0 lb ai/A of picloram, regardless of formulation, had the highest three-year average production. Plots treated with dicamba and lower rates of picloram had lower average production. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1119)

Forage production one, two and three years after treatment

Treatment	Rate lb ai/A	Air dry forage (pounds/A)			
		1979	1980	1981	Average
picloram (K salt)	2.0	1,098	1,010	1,832	1,313
picloram (2% beads)	2.0	992	601	2,278	1,290
picloram (K salt)/2,4-D (amine)	2.0 + 4.0	1,054	520	1,776	1,117
picloram (2% beads)	1.0	981	786	1,552	1,106
picloram (K salt)/2,4-D (amine)	1.0 + 2.0	1,240	1,160	850	1,083
picloram (K salt)	0.5	1,111	947	818	959
picloram (K salt)	1.0	896	558	1,337	930
dicamba 4L	4.0	1,137	665	708	837
dicamba 4L	8.0	917	471	862	750
picloram (2% beads)	0.5	1,005	621	620	749
picloram (K salt)/2,4-D (amine)	0.5 + 1.0	930	616	676	741
Check	---	535	416	402	451

Longevity of Canada thistle control in a crested wheatgrass pasture. Alley, H. P. and N. E. Humburg. Plots were established in 1979 to compare the effectiveness and longevity of control of Canada thistle resulting from applications of chlorsulfuron, tebuthiuron, Dowco 290 (M 3972) and the combinations of Dowco 290/2,4-D amine (M 3785) as compared to picolinic acid. At time of herbicide application, August 6, 1979, the Canada thistle was in full bloom and growing under extreme drought conditions.

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

Visual observations for evaluation of Canada thistle top growth control and grass damage were made on August 2, 1980, and July 27, 1981. Chlorsulfuron at all rates of application, Dowco 290 (M 3972) at 2.0 lb ai/A, the combination of Dowco 290/2,4-D amine (M 3785) at 2 gal/A and picloram at 2.0 lb ai/A all gave 100% control, two years following treatment. Chlorsulfuron applied at 1.0 lb ai/A and above and picloram at 2.0 lb ai/A reduced the stand of crested wheatgrass 50%. Dowco 290 (M 3972) did not cause a reduction in grass stand. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1133).

Herbicides, Canada thistle shoot control

Herbicides[1]	Rate lb ai/A	Percent control[2] 1980	1981	Observations
chlorsulfuron	0.25	100	100	No grass damage
chlorsulfuron	0.5	100	100	20% reduction grass
chlorsulfuron	1.0	100	100	50% reduction grass
chlorsulfuron	2.0	100	100	50% reduction grass
tebuthiuron 20P	1.0	0	40	60% reduction grass
tebuthiuron 20P	2.0	50	90	70% reduction grass
tebuthiuron 20P	4.0	80	100	Bare ground
Dowco 290 (M 3972)	1.0	100	95	No grass damage
Dowco 290 (M 3972)	2.0	100	100	No grass damage
Dowco 290 + 2,4-D amine	0.5 + 2.0	100	90	No grass damage
Dowco 290 + 2,4-D amine	1.0 + 4.0	100	100	No grass damage
picloram	2.0	100	100	50% reduction grass

[1]Herbicides applied August 6, 1979.
[2]Visual evaluations August 2, 1980, and July 27, 1981.

Measurement of grass forage produced and grazed in a leafy spurge infestation and adjacent treatment areas 1 year following treatment. Vore, R. E., H. P. Alley and N. E. Humburg. This study was conducted to monitor forage production and cattle grazing in a leafy spurge infestation and adjacent areas treated with dicamba and picloram.

Plots were established May 29, 1980, on a leafy spurge infestation while in pre-bud to full flower stage of growth, 14 to 24 inches high. Applications were made with a hand operated centrifugal broadcaster. Plots were 80 ft by 100 ft with 1 replication. Soil was a silty loam (31.4% sand, 62.2% silt, 6.4% clay, 2.8% organic matter, pH 7.6). Five range exclosures were established on April 9, 1981, in each treatment area and the untreated check. On May 21, 1981, a 2.5 ft diameter quadrat area was clipped, both inside and adjacent to each exclosure. Pounds air-dry forage/A (12% moisture) was determined and average production was computed. Grass species were not separated as total forage production measurement was desired.

Total forage production was 1,844 lbs/A in the untreated check and was reduced by dicamba at 8.0 lb ai/A and picloram at 2.0 lb ai/A by 143 and 660 lb/A, respectively. Forage production was greater in the plot areas receiving dicamba at 6.0 lb ai/A and picloram at 1.0 lb ai/A by 550 and 903 lb/A, respectively. Cattle left approximately the same amount of forage ungrazed in all treatment areas. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1126)

Grass forage produced and grazed

Treatment	Rate lb ai/A	Air dry forage (pounds/A)		
		Grazed	Remaining	Total Production
dicamba 5G	6.0	1,312	1,082	2,394
dicamba 5G	8.0	899	802	1,701
picloram (2% pellet)	1.0	1,886	861	2,747
picloram (2% pellet)	2.0	431	753	1,184
Check	--	874	970	1,844

Measurement of grass forage produced and grazed in a leafy spurge infestation and adjacent treatment area 2 years following treatment. Vore, R. E., H. P. Alley and N. E. Humburg. Removal of a perennial weed infestation such as leafy spurge can, among other benefits, increase total forage production. However, it is not well understood the extent of livestock grazing in a leafy spurge infestation and adjacent treatment areas. This study was conducted to determine forage production and livestock grazing in a leafy spurge infestation, before and after treatment.

Five range exclosures were established on September 2, 1980, in a leafy spurge infestation. Also, five exclosures were established in an adjacent area aerially treated with picloram (2% beads) at 2.0 ai/A in September 1979. On June 3, 1981, a 2.5 ft diameter quadrat area was clipped, both inside and adjacent to each exclosure. Pounds air-dry forage/A (12% moisture) was determined and average production was computed. Species were not separated as total forage production measurement was desired.

Cattle left ungrazed approximately the same amount of forage in the leafy spurge infestation and the treatment area. However, the area treated with picloram (2% beads) at 2.0 lb ai/A produced 246 lbs/A more forage than did the check or infestation area. Cattle grazed 438 lbs air-dry forage/A in the treatment area as compared to 173 lb/A in the leafy spurge infestation. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1122).

Grass forage produced and grazed

Treatment	Rate lb ai/A	Air dry forage (pounds/A)		
		Grazed	Remaining	Total Production
picloram (K salt)	2.0	438	220	658
Check	--	173	239	412

Pre-emergent and post-emergent herbicide treatments for quackgrass control in sugar beets and potatoes. LEINO, P. W., S. W. Gawronski, and R. H. Callihan. Pre-plant treatments of EPTC, EPTC plus R-33865 and combinations with metribuzin applied to potatoes and post-emergent treatments of RO-138895, BAS 9052 OH, and fluazifop-butyl applied to potatoes and sugar beets were evaluated for quackgrass control.

The pre-plant treatments of EPTC, EPTC/R-33865 and metribuzin combinations were applied on April 29, 1981 to a previously plowed pasture field. The soil surface was dry with 60% available soil moisture (ASM) at a 15-cm depth. The treatments were incorporated by cultivating twice with a disc. The post-emergent potato plots were located directly adjacent to the pre-plant plots and application of treatments was made on July 20, 1981 shortly before the potato canopy closed over the rows. Two post-emergent sugar beet applications were made; the first on August 7, 1981 and the second on September 18, 1981. The sugar beet stand was poor due to frost at the time of emergence Open areas allowed more quackgrass. Both fields were commercial fields in the Aberdeen, Idaho area and have a Declo loam soil.

All treatments in potatoes were applied to 3.7 by 12.2 m plots with a tractor-mounted sprayer with a 3.7 m boom, 8005 nozzles, calibrated to deliver 327 L/ha (35 gpa). A randomized complete block design with four replicates was used. Sugar beets were sprayed with a bicycle sprayer with a 1.9 m boom, 8005 nozzles, calibrated to deliver 168 L/ha (18 gpa). A randomized complete block design with five replicates was used.

The potato field had a homogenous quackgrass population of approximately 15 shoots/m^2 which emerged 1 to 2 weeks later than the potatoes emerged. Ratings of the pre-plant quackgrass treatments show no statistical differences between treatments. This may be due to the disappearance of EPTC activity prior to the late emerging quackgrass. The post-emergent treatments assessed 10 days after treatment (June 30, 1981) also showed no differences. All treatments exhibited a significantly greater control of quackgrass than the check at the second assessment 29 days after treatment (August 19, 1981). Control increased generally as dosage of RO-138895 and BAS 9052 OH was increased. No increases in vigor reduction were noted with increase in dosage of fluazifop-butyl. No differences in yield of U.S. No. 1 potatoes or in total yield were seen.

The initial assessment of the sugar beet plots on August 21, 1981 was made 2 weeks after the first application of 0.6 Kg/ha of the tested herbicides to all treated plots. Therefore the first assessment had duplicate treatments of each herbicide at the 0.6 Kg/ha rate. All treatments showed a 28 to 36% injury of quackgrass at this time. The second assessment (October 16, 1981) was made about 9 weeks after the second application of 0.6 Kg/ha to plots with treatment numbers 3, 5, and 7. RO-138895 with a single application (0.6 Kg/ha) showed 81% quackgrass injury. RO-138895 with a double application (0.6+0.6 Kg/ha) increased quackgrass injury to 90%. BAS 9052 OH also showed an increase in injury to quackgrass with a second application from 62% with the single application to 75% with the double application. Similarly fluazifop-butyl showed an increase in quackgrass injury from 86% with the single application to 96% with a double application and thus exhibited the best quackgrass control. (Research & Extension Center, University of Idaho, Aberdeen, ID 83210).

Table 1. Quackgrass injury two and eleven weeks after treatment

Treatment[1/]	Rate Kg/ha	% Injury 8-21[2/]	10-16[3/]
1. Check	0	0	25
2. RO-138895	0.6	28	81
3. RO-138895	0.6 + 0.6	35	90
4. BAS 9052 OH	0.6	36	62
5. BAS 9052 OH	0.6 + 0.6	30	75
6. Fluazifop-butyl	0.6	35	86
7. Fluazifop-butyl	0.6 + 0.6	31	96
LSD 5%		8.2	7.9
C.V.		22.7	8.3

Table 2. Quackgrass density and vigor reduction 10 and 29 days after treatment and potato yield data

Treatment[1/]	Rate Kg/ha	Quackgrass 7-30-81 Shoots/m^2	VR	8-19-81 Shoots/m^2	VR	Yield (Kg/plot) US 1's	Total Yield
1. Check	0	14	0	16	15	47.6	65.2
2. RO-138895	0.6	13	48	3	59	44.5	61.5
3. RO-138895	0.8	10	43	1	91	48.2	66.3
4. RO-138895	1.1	12	34	3	79	45.3	65.8
5. RO-138895	1.7	13	41	2	91	43.0	62.3
6. BAS 9052 OH	0.6	7	38	5	66	54.0	69.8
7. BAS 9052 OH	0.8	8	36	5	68	49.0	65.8
8. BAS 9052 OH	1.1	11	39	5	81	48.6	68.7
9. BAS 9052 08	1.7	12	49	4	85	44.8	62.6
10. Fluazifop-butyl	0.6	13	39	5	75	40.6	56.8
11. Fluazifop-butyl	0.8	16	49	5	75	50.9	70.5
12. Fluazifop-butyl	1.1	13	43	7	76	50.9	71.3
13. Fluazifop-butyl	1.7	15	44	5	76	38.8	57.9
LSD 5%		9.9	13.0	5.5	26.1	10.8	
C.V.		61.6	21.6	79.7	25.2	7.3	

Table 3. Quackgrass density 13 weeks and 16 weeks after treatment

Treatment	Rate Kg/ha	Quackgrass 7-30-81 Shoots/m^2	8-20-81 Shoots/m^2
1. EPTC	3.4	26	17
2. EPTC	4.5	15	9
3. EPTC/R-33865	3.4	17	10
4. EPTC/R-33865	4.5	27	18
5. Check	0	21	14
6. EPTC+Metribuzin	3.4 + 0.28	18	8
7. Eptc + Metribuzin	3.4 + 0.28	17	8
8.	0.6	17	9
LSD 5%		16.8	12.4
C.V.		58.2	74.0

1/ All treatments had adjuvants added:RO-138895 plus 0.5% X-77, BAS 9052 OH plus 1% Agrioil, and Fluazifop-butyl 0.1% X-77.
2/ Assessed after initial treatment (August 7, 1981)
3/ Assessed after second treatment was applied September 18, 1981
4/ VR = Vigor reduction

Wild licorice, *Glycyrrhiza lepidota* (Nutt.) pursh, control in pasture. Vore, R. E., H. P. Alley and N. E. Humburg. Wild licorice, a perennial herbaceous weed, is a problem weed in pasture, rangeland, meadows and along roadways. It is a problem to livestock producers, especially woolgrowers, because of the seed containing reddish-brown burs. Wild licorice is tenacious, being able to withstand mowing, grazing and cultivation. Therefore, this experiment was undertaken to evaluate herbicide controls.

Plots were established on July 12, 1980, in a small draw bottom when the wild licorice was in the bud or pre-flower stage of growth, 14 to 20 inches high. Plots were 9 ft by 30 ft arranged in a complete random design with 1 replication.

All treatments provided 95 to 100% control of wild licorice top growth. However, plots treated with 2,4-D and dicamba had regrowth of field pennycress, tansy mustard and horsemint present, one year after treatment. Picloram-treated areas had no weed regrowth, one year after treatment.

Western wheatgrass and bluegrass growth was excellent in all treatment areas, but was prostrate in the areas treated with picloram. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1120)

Wild licorice control

Treatment	Rate lb ai/A	Percent control	Remarks
2,4-D amine	1.0	95	
2,4-D amine	2.0	95	Field pennycress, tansy mustard and horsemint invaded these areas.
dicamba 4L	1.0	95	
dicamba 4L	2.0	98	
picloram (K salt)	0.25	100	
picloram (K salt)	0.5	100	Bluegrass and western wheatgrass prostrate.
picloram (K salt)	1.0	100	
Check	--	0	

PROJECT 2

HERBACEOUS WEEDS OF RANGE AND FOREST

Ron Vore - Project Chairman

The effect of fall and spring applied herbicides on the control of common crupina. Miller, T. L., D. C. Thill, D. L. Kambitsch and R. H. Callihan. Common crupina (Crupina vulgaris) currently infests approximately 9,200 ha of rangeland in Idaho, Clearwater and Lewis counties of northern Idaho. An experiment to examine the efficacy of several herbicides applied in both the fall and spring for the control of common crupina was established near Grangeville, Idaho. Liquid formulations were applied by a CO_2 pressurized knapsack sprayer equipped with a three nozzle boom and calibrated to deliver 378.5 l/ha of spray solution for all herbicide treatments except for treatments containing SULV (Special Ultra Low Volume) formulation of 2,4-D which were applied at 47.1/ha. Granular formulations were applied by hand to the soil surface. The experiment was arranged as a split block design with fall and spring applications of the same treatment side by side. The experiment contained four replications with each plot 3 x 9 m in size. Fall treatments were applied on November 12, 1980 and spring treatments were applied on April 23, 1981.

Percent common crupina control was visually evaluated eight and three months after the application of fall and spring treatments, respectively. Forage samples were collected in early July by randomly placing 0.5 m^2 circle in each plot. All live plants within this area were harvested at the soil surface and were divided into three categories: Common crupina, all grass species, and all other broadleaf species. Samples were dried at 57 C for a period of one week and then weighed.

All herbicide treatments containing picloram or dicamba gave excellent to good control of common crupina except for the fall applications of dicamba + 2,4-D and dicamba + SULV 2,4-D, both applied at 0.56 + 1.12 kg/ha, and picloram + 2,4-D at 0.14 + 1.12 kg/ha applied in the spring (Table 1). A nonuniform distribution of granular picloram within the plot area resulted in inadequate control of common crupina. Glyphosate, 2,4-D and SULV treatments applied in the fall or spring failed to give adequate control of common crupina except for 2,4-D applied in the fall at the rate of 2.24 kg/ha.

Forage samples harvested from the plots indicate the level of control resulting from the various herbicide treatments (Table 2). Fall applications of picloram and dicamba as well as their tank mixes with 2,4-D or SULV, significantly reduced the yield of common crupina when compared to the spring treatments. All herbicides tested significantly reduced the yield of common crupina when compared to the check. Grass yields were significantly increased with fall applications of picloram or dicamba or their tank mixes. The spring applications of picloram also significantly increased grass yields when compared to the check. Annual grasses were the predominant grass species in this plot area. The dry weight yield of the other broadleaf species was significantly reduced by applications of picloram + 2,4-D at 0.14 + 1.12 and 0.28 + 1.12 kg/ha, picloram + SULV 2,4-D at the 0.28 + 1.12 kg/ha, dicamba + 2,4-D and dicamba + SULV 2,4-D at the 0.56 + 1.12 kg/ha and 2,4-D at the 2.24 kg/ha rates when applied in the spring. The dry weight yields of other broadleaf species were not significantly reduced by fall herbicide applications. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Table 1. Visual evaluation of several herbicides for the control of *Crupina vulgaris*.

Treatment[2]	Application Time	Rate (kg/ha)	Percent Control
Picloram	F	0.14	100
Picloram	F	0.28	100
Picloram	F	0.56	100
Picloram	S	0.56	100
Picloram + 2,4-D	F	0.14 + 1.12	100
Picloram + 2,4-D	F	0.28 + 1.12	100
Picloram + 2,4-D	S	0.28 + 1.12	100
Picloram + SULV (2,4-D)	F	0.28 + 1.12	100
Dicamba	F	2.24	100
Dicamba	S	2.24	100
Dicamba	S	1.12	99
Picloram	S	0.28	98
Dicamba + 2,4-D	S	0.56 + 1.12	97
Dicamba	F	0.56	95
Dicamba	F	1.12	95
Dicamba	S	0.56	95
Picloram + SULV (2,4-D)	S	0.14 + 1.12	91
Dicamba + SULV (2,4-D)	S	0.56 + 1.12	88
Picloram + SULV (2,4-D)	S	0.14 + 1.12	86
Picloram	S	0.28	85
Picloram + SULV (2,4-D)	S	0.28 + 1.12	82
Dicamba + 2,4-D	F	0.56 + 1.12	73
2,4-D	F	2.24	72
Dicamba + SULV (2,4-D)	F	0.56 + 1.12	70
Glyphosate	S	0.56	63
2,4-D	S	2.24	58
Picloram (2% pell)	S	0.56	53
Glyphosate	F	0.56	52
2,4-D	S	1.12	50
Picloram (2% pell)	F	0.56	48
SULV (2,4-D)	F	1.12	47
Picloram (2% pell)	F	0.28	47
2,4-D	F	1.12	45
Picloram + 2,4-D	S	0.14+1.12	44
SULV (2,4-D)	S	2.24	40
SULV (2,4-D)	F	2.24	36
Picloram (2% pell)	S	0.28	36
SULV (2,4-D)	S	1.12	30
Check	F		0
Check	S		0
	$LSD_{0.05}$		6

1 Evaluations made July 23, 1981
2 Application dates: Fall, November 12, 1980; Spring, May 23, 1981.

Table 2. Effects of herbicide applications on the forage yields of common crupina infested rangeland.

Treatment	Application[2] Time	Rate kg/ha	Yield, kg/ha[3] Com. Crupina	Grass	br.leaves
picloram	F	0.14	0	1499	681
picloram	F	0.28	0	1175	842
picloram	F	0.56	0	1345	516
picloram + 2,4-D	F	0.14 + 1.12	192	1373	1049
picloram + 2,4-D	F	0.28 + 1.12	0	1043	686
picloram + SULV(2,4-D)	F	0.14 + 1.12	96	901	720
picloram + SULV(2,4-D)	F	0.28 + 1.12	50	626	846
picloram (2% pellets)	F	0.28	582	956	467
picloram (2% pellets)	F	0.56	445	1329	747
picloram	S	0.14	121	890	1285
picloram	S	0.28	41	791	1038
picloram	S	0.56	0	1016	934
picloram + 2,4-D	S	0.14 + 1.12	9	955	390
picloram + 2,4-D	S	0.28 + 1.12	314	571	533
picloram + SULV(2,4-D)	S	0.14 + 1.12	441	455	1521
picloram + SULV(2,4-D)	S	0.28 + 1.12	291	368	354
picloram (2% pellets)	S	0.28	447	917	538
picloram (2% pellets)	S	0.56	593	384	522
check	F	0.00	1686	377	670
check	S	0.00	917	621	835
dicamba	F	0.56	39	736	1499
dicamba	F	1.12	20	390	1252
dicamba	F	2.24	49	967	1087
dicamba + 2,4-D	F	0.56 + 1.12	0	847	840
dicamba + SULV(2,4-D)	F	0.56 + 1.12	422	862	1148
dicamba	S	0.56	324	429	1005
dicamba	S	1.12	150	225	1208
dicamba	S	2.24	82	549	906
dicamba + 2,4-D	S	0.56 + 1.12	168	676	379
dicamba + SULV(2,4-D)	S	0.56 + 1.12	368	533	544
2,4-D	F	1.12	291	488	1214
2,4-D	F	2.24	236	752	1027
SULV (2,4-D)	F	1.12	313	994	873
SULV (2,4-D)	F	2.24	533	730	780
glyphosate	F	0.56	461	379	780
2,4-D	S	1.12	368	610	1109
2,4-D	S	2.24	544	956	467
SULV (2,4-D)	S	1.12	472	483	1181
SULV (2,4-D)	S	2.24	516	972	1010
glyphosate	S	0.56	309	428	1318
		$LSD_{0.05}$	155	197	277

1 Forage samples collected 6-24 to 7-3 1981.
2 Application dates: Fall, November 12, 1980; Spring, May 23, 1981.
3 Yields are calculated on a dry weight basis.

Effects of herbicides on diffuse knapweed density. Sheley, R. L. and B. F. Roche. An experiment was conducted on abandoned farmland in Stevens County to evaluate the performance of various herbicide treatments on diffuse knapweed (*Centaurea diffusa*). Herbicides were applied in late May of 1980. Formulations were applied in 374 l/ha of water with a backpack plot sprayer equipped with four 8004 nozzles. Plots were 2 x 3.3 m, arranged in a randomized complete block design and replicated four times. Knapweed densities were counted in May of 1981.

Picloram at .28 kg/ha and .56 kg/ha, picloram at .14, .28, and .56 kg/ha + 2,4-D LVE at 1.12 kg/ha, and Dowco 290 at .14 and .28 kg/ha + 2,4-D LVE at 1.12 lb/A decreased diffuse knapweed densities to zero. Application of 2,4-D LVE at 1.12 and 2.24 kg/ha, 2,4-DB at 1.68 kg/ha, Dowco 290 at .56 kg/ha + 2,4-D LVE at 1.12 kg/ha, Dicamba at .28 and .56 kg/ha + 2,4-D LVE at 1.12 kg/ha did not significantly differ from the above treatments, however, densities ranged from 1.75 to 6.25 plants per 5^2 dm. DPX 4189 at .0175, .035, .07, and .14 kg/ha, glyphosate at .28 and .56 kg/ha and 2,4-DB at 1.12 kg/ha did not significantly reduce diffuse knapweed densities compared to the control. (Washington State University Cooperative Extension Service, Pullman, WA 99164)

Diffuse knapweed densities one year after spring herbicide treatment

Treatment	Rate	Density
	(kg/ha)	(plant no./5 dm^2)
Control #1	-	15.00 abc
Control #2	-	15.25 abc
DPX 4189 (chlorosulfuron)	.0175	20.75 a
DPX 4189 (chlorosulfuron)	.035	9.00 cde
DPX 4189 (chlorosulfuron)	.07	16.75 abc
DPX 4189 (chlorosulfuron)	.14	9.00 cde
2,4-D LVE	1.12	6.00 de
2,4-D LVE	2.24	1.75 de
2,4-DB	1.12	18.00 ab
2,4-DB	1.68	5.50 de
picloram	.28	0.25 e
picloram	.56	0.00 e
2,4-D LVE + Dowco 290 (M3972)	1.12 + 0.14	0.00 e
2,4-D LVE + Dowco 290 (M3972)	1.12 + 0.28	0.00 e
2,4-D LVE + Dowco 290 (M3972)	1.12 + 0.56	6.25 de
2,4-D LVE + dicamba	1.12 + 0.28	2.25 de
2,4-D LVE + dicamba	1.12 + 0.56	1.75 de
2,4-D LVE + picloram	1.12 + 0.14	0.00 e
2,4-D LVE + picloram	1.12 + 0.28	0.00 e
2,4-D LVE + picloram	1.12 + 0.56	0.25 e
glyphosate	.28	15.50 abc
glyphosate	.56	9.75 bcd

[1] Means followed by the same letter(s) are not significantly different at the .05 level according to Duncan's Multiple Range Test.

Pasture weed control in Idaho. Lish, J. M., D. C. Thill, and R. H. Callihan. Pasture experiments were initiated near Weiser, Potlatch and Bonners Ferry, Idaho, to determine the effect of herbicide combinations on weed control. The pasture site at Weiser was irrigated, whereas the other two locations did not receive any irrigation. Treatments were applied April 30 and May 14 at Weiser and Bonners Ferry, respectively. Both pastures had been grazed previous to treatment and were fenced to keep cattle out after treatment. A variety of annual and perennial broadleaf weeds was present at the time of application. The experimental design was a randomized complete block with three replications at Weiser and four replications at Bonners Ferry. Treatments at Potlatch were applied on June 11 and August 13 to determine the effect of application timing on weed control. The Potlatch location had a near solid stand of tansy and small amount of grass. The experimental design was a split-plot with four replications. Treatments at all locations were applied with a backpack sprayer calibrated to deliver 187 l/ha at 28 kg/cm^2 pressure from a CO_2 source. Air temperature and soil temperature at 15 cm was 28 and 18 C at Weiser and 22 and 19 C at Bonners Ferry, respectively. Air temperature and soil temperature at 15 cm at Potlatch was 20 and 13 C on July 11 and 36 and 20 C on August 13, respectively. Weed control was evaluated visually on May 22 at Weiser, on July 22 at Bonners Ferry and on July 30 and October 10 at Potlatch.

Broadleaf weed control was 92% or greater with the three highest rates of dicamba + 2,4-D and picloram at 0.28 and 1.12 kg/ha at Weiser (Table 1). Weed control was not adequate with all other treatments. Weed dry matter yield was lower than the check for all treatments except dicamba at 0.57 and 1.12 kg/ha which were not significantly different from the check. Differences in forage yield were not significantly different. Nutritive analysis of percent acid detergent fiber was higher in forage samples than weed samples, but percent protein was higher in the weed samples (data not shown). The weeds were covered by the canopy of the grass and were at an earlier phenological growth stage at the time of sampling for forage quality.

Weed control at Bonners Ferry was generally poor except for the high rates of picloram and broadleaf plantain control with 2,4-D at 3.36 kg/ha (Table 2). Heavy rain fell 5 h after application and rainfall was frequent in following weeks.

Tansy was controlled at Potlatch by application of dicamba at 1.12 and 2.24 kg/ha, dicamba + 2,4-D combinations at the three highest rates, and picloram at 0.57 kg/ha when applied on June 11 (Table 3). August applications were ineffective in controlling tansy and always resulted in lower controls than the same treatment applied in June. Tansy was 1.5 m tall and in full bloom in August and only 0.6 m tall in May. (University of Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Table 1. The influence of herbicide combinations on weed control and forage yield in irrigated pasture at Weiser, Idaho.

Herbicide Treatment	Rate	Yield Forage	Yield Weeds	Weed Control[1]
	(kg/ha)	------(kg/ha)----		(%)
dicamba	0.28	730	25	10
dicamba	0.57	770	82	13
dicamba	1.12	490	43	42
dicamba	2.24	720	19	58
dicamba	4.48	1010	3	57
2,4-D	0.42	980	13	47
2,4-D	0.84	970	0	22
2,4-D	1.68	910	0	42
2,4-D	3.36	970	0	63
dicamba + 2,4-D	0.28 + 0.42	480	0	47
dicamba + 2,4-D	0.57 + 0.57	770	2	67
dicamba + 2,4-D	0.57 + 0.84	470	0	48
dicamba + 2,4-D	1.12 + 1.12	520	10	31
dicamba + 2,4-D	1.12 + 1.68	630	23	95
dicamba + 2,4-D	2.24 + 2.24	530	40	98
dicamba + 2,4-D	2.24 + 3.36	910	0	92
picloram	0.28	740	27	93
picloram	0.57	810	1	77
picloram	1.12	960	0	92
check	--	[illegible]20	62	0
$LSD_{0.05}$		NS	28.6	36

[1] Weeds present included broadleaf plantain, curly dock, common dandelion and may weed.

Table 2. The effect of herbicide combinations on weed control in pasture at Bonners Ferry, Idaho.

Herbicide Treatment	Rate	Weed Control Blpl	Weed Control Coda	Weed Control Coya
	(kg/ha)	-----------(%)----------		
dicamba	0.14	18	32	23
dicamba	0.28	25	21	58
dicamba	0.57	30	30	22
dicamba	1.12	26	64	75
dicamba	2.24	44	68	47
2,4-D	0.42	66	58	73
2,4-D	0.84	78	58	43
2,4-D	1.68	75	61	5
2,4-D	3.36	92	78	42
dicamba + 2,4-D	0.14 + 0.42	52	49	77
dicamba + 2,4-D	0.28 + 0.57	46	51	78
dicamba + 2,4-D	0.28 + 0.84	54	60	27
dicamba + 2,4-D	0.57 + 1.12	50	56	33
dicamba + 2,4-D	0.57 + 1.68	45	46	33
dicamba + 2,4-D	1.12 + 2.24	51	41	53
dicamba + 2,4-D	1.12 + 3.36	75	78	33
picloram	0.28	61	86	83
picloram	0.57	76	99	98
picloram	1.12	93	100	98
check	-	0	0	0
$LSD_{0.05}$		38	37	46

Table 3. Tansy control in pasture with herbicide combinations applied at two timings at Potlatch, Idaho.

Treatment	Rate	Application Time	Evaluation Date July 30	Evaluation Date October 10
	(kg/ha)		--------(%)----------	
dicamba	0.14	June	39	48
		August	--	15
dicamba	0.28	June	39	46
		August	--	16
dicamba	0.57	June	29	56
		August	--	16
dicamba	1.12	June	55	95
		August	--	20
dicamba	2.24	June	71	90
		August	--	32
2,4-D	0.42	June	9	21
		August	--	16
2,4-D	0.84	June	15	50
		August	--	40
2,4-D	1.68	June	13	35
		August	--	24
2,4-D	3.36	June	25	46
		August	--	18
dicamba + 2,4-D	0.14 + 0.42	June	10	35
		August	--	14
dicamba + 2,4-D	0.28 + 0.57	June	29	74
		August	--	12
dicamba + 2,4-D	0.28 + 0.84	June	30	46
		August	--	25
dicamba + 2,4-D	0.57 + 1.12	June	52	86
		August	--	25
dicamba + 2,4-D	0.57 + 1.68	June	64	91
		August	00	50
dicamba + 2,4-D	1.12 + 2.24	June	79	92
		August	--	38
dicamba + 2,4-D	1.12 + 3.36	June	74	88
		August	--	25
picloram	0.28	June	49	86
		August	--	13
picloram	0.57	June	76	92
		August	--	35
picloram	1.12	June	92	77
		August	--	43
check	-		0	0
$LSD_{0.05}$			23	28

The effect of herbicide residue in soil on conifer seedling survival. Holt, D.B. and S.R. Radosevich. A study was initiated during the Spring, 1981 at the University of California Blodgett Experimental Forest, El Dorado County, California to determine the effects of soil residues of post emergence herbicides on three conifer species. The species were nursery grown seedlings of ponderosa pine, Douglas fir and white fir.

The experiment was conducted as a split plot design with the herbicide treatment (Table 1) as main plots and conifer planting dates (Table 1) as subplots. Each subplot contained 3 trees per species. The experiment was replicated 3 times. Treatments were applied with a constant pressure sprayer at 20 gallons of solution/acre directly to the soil surface. Seedlings were planted on the day of application and approximately 2 and 4 weeks thereafter. A visual evaluation of seedling survival was made 215 days after the first planting date. The results are presented in Table 1.

Significant mortality of white fir and Douglas fir occurred on all plots as the season progressed. This made evaluation of herbicide effects on these species difficult. However, our observations suggest that trees may be planted soon after application of 2,4-D, glyphosate, and triclopyr. Atrazine and hexazinone treatments resulted in greater seedling mortality on the initial planting date and an overall decrease in seedling survival over time. (Department of Botany, University of California, Davis, California 95616).

Conifer tolerance to herbicide soil residues

% Survival (1981)

Herbicide	Rates lb/A	Ponderosa Pine			White Fir			Douglas Fir		
		4/17	5/1	5/15	4/17	5/1	5/15	4/17	5/1	5/15
2,4-D	3	100	100	100	78	11	33	78	33	44
glyphosate	3	100	100	100	44	44	33	67	67	22
triclopyr	3	100	100	100	55	44	44	55	55	33
atrazine	5	67	100	100	11	22	11	67	55	33
hexazinone	5	44	78	78	0	0	0	0	0	0
control	-	100	78	78	44	33	22	67	55	22

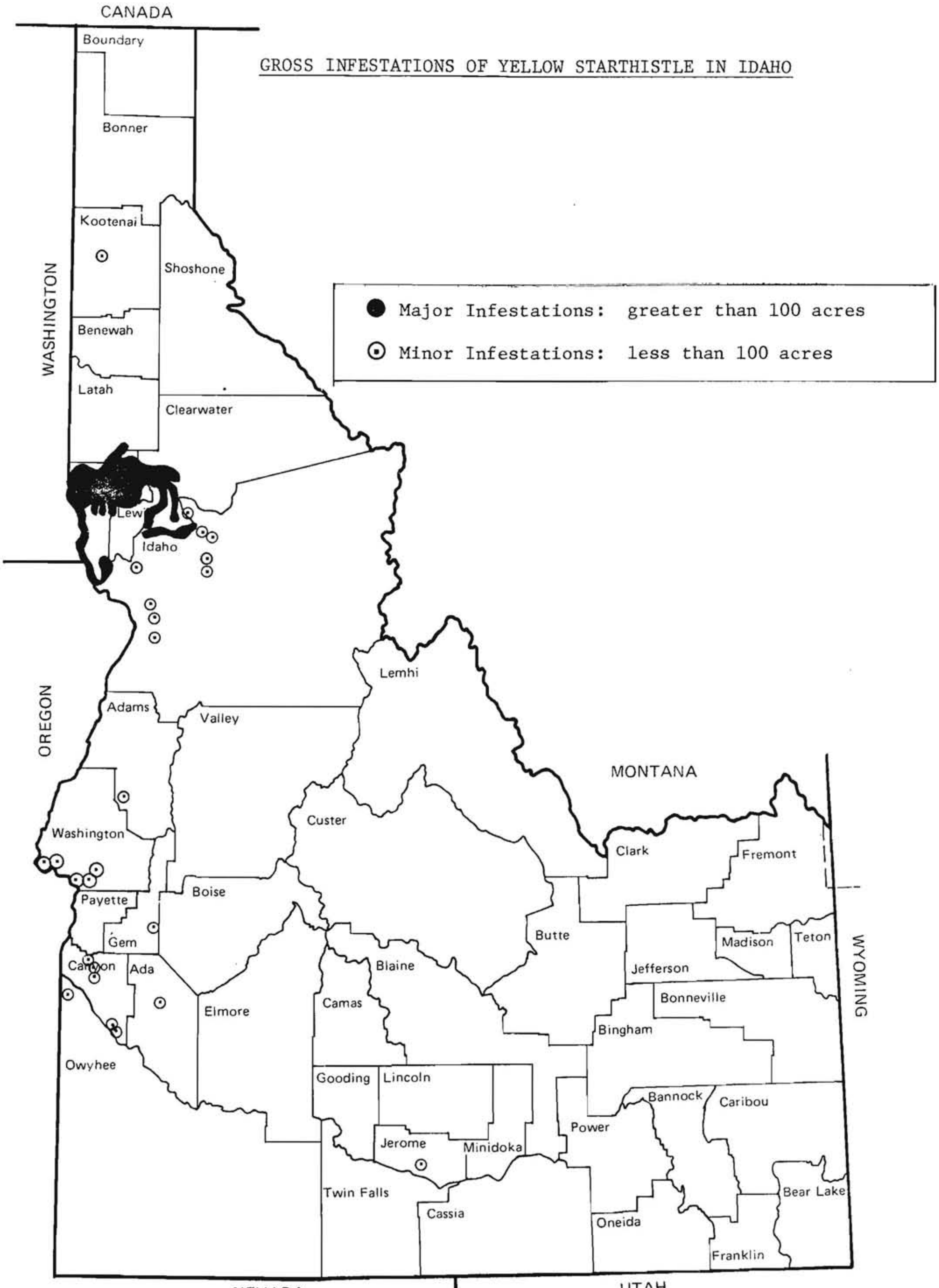
4/17/81, 5/1/81, and 5/15/81 refer to dates on which conifers were planted.

Survey of Yellow Starthistle (*Centaurea solstitialis*) Infestations in Idaho. Sheley, R. L., R. H. Callihan and D. C. Thill. An intensive delimiting survey of yellow starthistle in Idaho was conducted during June and July of 1981. Large-scale perimeter boundaries and localized infestations were determined by aerial and ground surveillance. The aerial phase made use of a Cessna 180 fixed-wing aircraft flying approximately 85 miles per hour and 1500 feet above ground level for 12 hours. Due to yellow starthistle's characteristic bluegreen color during these months, trained observers could easily map infestations using the aircraft. Ground surveillance was used to verify the accuracy of aerial surveillance and to locate small infestations. All infestations were recorded on both 7.5 and 15 minute topographical maps. Gross acres, which is the extent of the land area infested, and net acres, the ground area covered by yellow starthistle plants were measured in each infested section, using a land locator template.

Yellow starthistle was found to infest 184,839 gross acres and 62,428 net acres of pasture and rangeland in 13 counties of Idaho (Table 1). Approximately 184,541 acres are infested on eight locations in Latah, Lewis, Clearwater, Idaho and Nez Perce Counties (Figure 1). Infestations in each of the other counties totaled less than 100 acres, and are located on 19 sites. Small localized infestations are currently under control programs, however, the major northern Idaho infestation is rapidly spreading.

Table 1. Acreages and counties of yellow starthistle infestation in Idaho.

County	Gross Acres	Net Acres
Ada	2	.5
Adams	80	20
Canyon	45	12
Clearwater	3,000	1,200
Gem	60	20
Idaho	12,000	4,500
Jerome	5	1
Kootenai	1	.5
Latah	4,840	1,620
Lewis	6,700	2,131
Nez Perce	158,000	52,900
Owyhee	40	10
Washington	66	13
TOTAL	184,839	62,428.0


GROSS INFESTATIONS OF YELLOW STARTHISTLE IN IDAHO
Major Infestations: greater than 100 acres
Minor Infestations: less than 100 acres
CANADA
WASHINGTON
OREGON
MONTANA
WYOMING
NEVADA
UTAH
Boundary
Bonner
Kootenai
Shoshone
Benewah
Latah
Clearwater
Lewis
Idaho
Lemhi
Adams
Valley
Washington
Custer
Clark
Fremont
Payette
Boise
Gem
Butte
Madison
Teton
Canyon
Ada
Blaine
Jefferson
Elmore
Camas
Bonneville
Bingham
Owyhee
Gooding
Lincoln
Bannock
Caribou
Power
Jerome
Minidoka
Twin Falls
Cassia
Bear Lake
Oneida
Franklin

Chemotaxonomic analysis of seed proteins as a means of biotype identification of yellow starthistle. Schumacher, A. E., R. L. Sheley, R. H. Callihan and D. C. Thill. Electrophoretic protein characterization was used to detect differences in 13 genotypically differing populations of yellow starthistle (Centaurea solstitialis L.) collected in Washington, Idaho and California (Table 1).

A 0.1 g sample of seed (combination of seeds with and without pappus) was ground in 3 ml of extraction medium (0.05 M phosphate buffer, 1% SDS (sodium dodecyl sulfate) and 1% mercaptoethanol). The slurry was centrifuged at 11,000 xg at room temperature for 20 minutes. The resulting supernatant was collected and 2 ml dissociating solution was added (0.05 M phosphate buffer, 2% SDS, 2% mercaptoethanol, 20% glycerol and bromophenol blue) and incubated for 5 minutes in a 100° C water bath.

SDS acrylamide gel electrophoresis was carried out according to the method of Weber and Osborn (1969). Ten percent acrylamide gels were established in 13 cm tubes. A phosphate electrode buffer (pH 7.0) was used. Fifty to 100 microliters of sample were added to the gels and the electrophoretic procedure was carried out at 8 milliamps per tube until the tracing dry front was 1 cm from the bottom of the tube (about 5 hours).

Gels were stained overnight at room temperature in 0.6 g Coomassie Blue in 250 ml of 50% methanol and 9.2% acetic acid. Gels were destained overnight at 60° C using a solution of 50% methanol and 9.2% acetic acid. The solution was then changed to 5% methanol and 7.5% acetic acid and destained overnight at 60° C. Gels were stored in 7.5% acetic acid for observations. Rf values were calculated by measuring to the bottom of the band. SDS-PAGE standards were run to determine molecular weight ranges of protein bands found in yellow starthistle.

No significant differences in protein banding were found among populations. Staining intensity and spatial arrangement of bands were very similar. Rf values did not significantly differ among populations. Fig. 1 shows a composite electrophoretic protein characterization of the 13 populations of yellow starthistle. Comparison of the protein characterization of yellow starthistle and the SDS-PAGE standard shows that yellow starthistle exhibited a wide range of proteins over 16 individual bands. (Idaho Agricultural Experiment Station, Moscow, ID 83843).

Location of Populations Characterized Electrophoretically

1. Hopland, CA
2. Lockwood, Monterey, Co., CA
3. Lichfield, CA
4. Bonanza, CA
5. Fox Ranch, CA
6. La Cuesta, CA
7. Trinity, Shasta Co., CA
8. Aldespoint, CA
9. Lapwai, Nez Perce Co., ID
10. Stites, Idaho Co., ID
11. State Creek, Idaho Co., ID
12. Yakima, Yakima Co., WA
13. Dayton, Columbia Co., WA

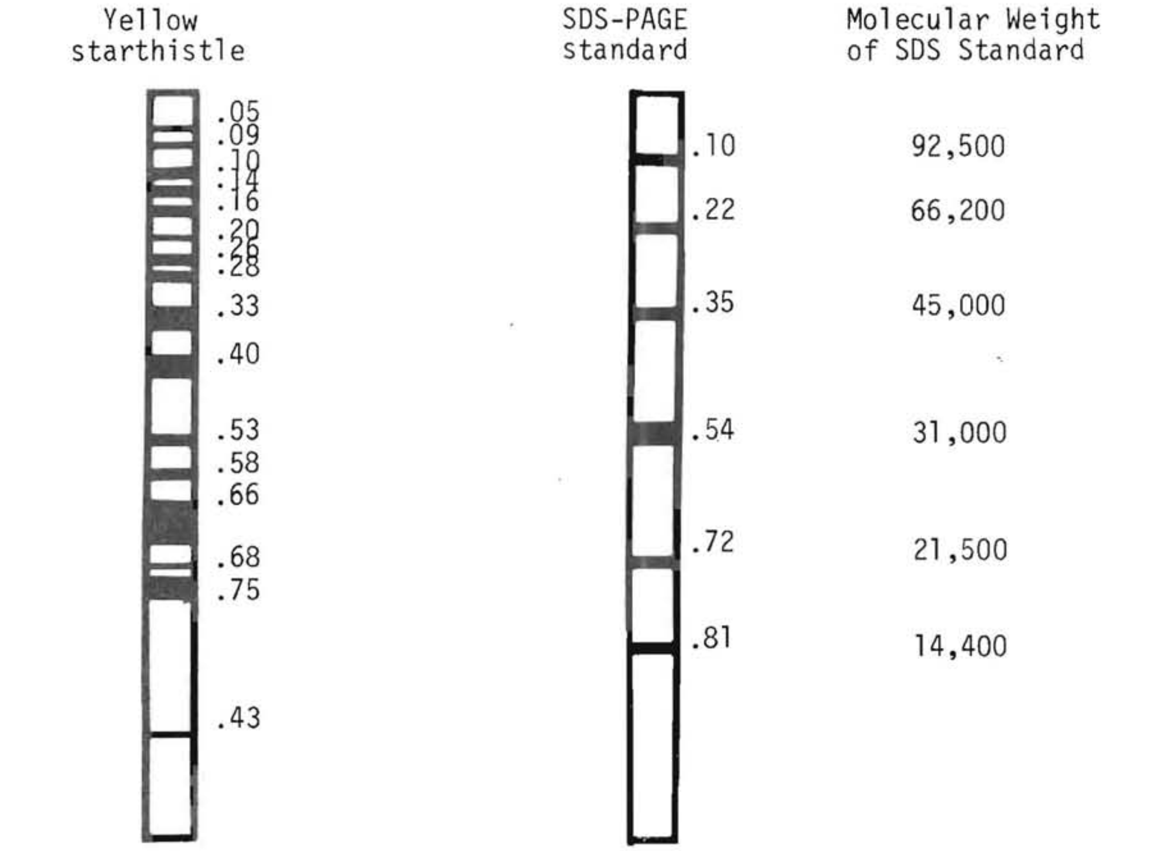


Fig. 1. Electrophoretic protein characterization of yellow starthistle and SDS-PAGE standard.

Genotypic variation among yellow starthistle populations. Huston, C., R. L. Sheley, R. H. Callihan and D. C. Thill. Yellow starthistle (*Centaurea solstitialis* L.) biotypes representing sixteen populations in the western states are being studied under uniform garden conditions to provide a comparative basis for determining genetic, morphological and phenological variation between populations. Seeds were collected in August, 1980 and 1981 from populations in Oregon, Washington, Idaho and California, and aligned along a precipitation gradient.

Four replications of 10 seeds from each population were sown in a randomized complete block design, spaced at 5-foot intervals on November 13 and 16, 1981. The site is located on a sandy loam soil on an island in the Snake River with a mean annual precipitation of 25-30 cm. Established plants will be allowed to mature. During this period, observations and measurements will be taken at selected intervals to assess phenological and morphological variation.

Yellow Starthistle Population Locations

Location	Annual Precipitation
1. Lichfield, CA	8-12"
2. Goldendale, WA	8-12"
3. Okanogen, Okanogen Co., WA	12-16"
4. Lockwood, Monterey Co., CA	12-16"
5. Slate Creek, Idaho Co., ID	12-16"
6. Lapwai, Nez Perce Co., ID	12-16"
7. Medford, Jackson Co., OR	16-20"
8. Rock Creek, WA	16-20"
9. Dayton, Columbia Co., WA	20-24"
10. San Luis Obispo, San Luis Obispo Co., CA	20-24"
11. Big Canyon, Lewis, Co, ID	20-24"
12. Stites, Idaho Co., ID	20-24"
13. Lower Lyle, Klickitat Co., WA	24-32"
14. Kenwood, Sonoma Co., CA	24-32"
15. Boonville, Mendocino Co., CA	32-48"
16. Trinity Co., Shasta Co., CA	32-48"

Integrated management for yellow starthistle. Sheley, R. L., R. H. Callihan and D. C. Thill. A project was initiated to develop a model in integrated pest management for yellow starthistle (Centaurea solstitialis). A major specific objective is to develop land restoration techniques for poor quality infested rangeland. Detailed tests are being conducted at three locations in northern Idaho. Research sites are located near Juliaetta, Lapwai and Orofino, Idaho.

The major objective of the investigation near Juliaetta was to develop rehabilitation techniques and grazing system recommendations for use after rehabilitation of yellow starthistle infested rangeland. During the spring and fall of 1981, six treatments or treatment combinations were installed in a randomized complete block design with four replications. Plots 0.4 ha were individually fenced with gates to allow for natural grazing and manipulation of grazing intensity. The experimental area was treated with an aerial application of Picloram (Tordon 22K) at 4 kg/ha on June 4, 1981. A 3 X 18 m check was established within each plot by covering with plastic tarp during spraying. Treatments consisted of 1) continuous grazing, 2) no grazing, 3) deferred grazing, 4) one year's rest followed by deferred grazing, 5) fall aerial seeding followed by one year's rest and deferred grazing, and 6) fall broadcast burning (as a seedbed preparation) followed by fall aerial seeding, one year's rest and deferred grazing. Subplots within each main plot were seeded with 18 kg/ha of Sherman big bluegrass (Poa ampla) or Greenar intermediate wheatgrass (Agropyron intermedium) to determine establishment characteristics of each species under these restoration conditions. Forage utilization by cattle will be managed to insure maintenance of optimum physiological vigor of the key species. Treatments will be evaluated for density and cover of the seeded forage species, yellow starthistle, and other weeds. Productivity will be evaluated in the spring and fall of each year, for the following three years.

The major objective of the experiment at Lapwai is to determine techniques or combinations of techniques for restoration of yellow starthistle infested rangeland. Burning for seedbed preparation, herbicide application, fertilization and seeding treatments were factorially arranged in a randomized complete block design replicated four times and repeated in the spring and fall on a representative site dominated by yellow starthistle. Treatment combinations include a spring herbicide application of 0.28 kg/ha picloram alone and followed by every individual and combination of backfire burning, aerial seeding with intermediate wheatgrass and fertilization with 112 kg/ha of 16-20-0. These treatments were applied either in the fall or spring, depending on theoretical probability of success according to reports of prior studies. All treatments and treatment combinations were repeated in the fall of 1981. One-half of the plot will be grazed and one-half non grazed to allow a comparison of grazed versus non grazed treatments. Evaluations of forage and weeds will be made during the subsequent three years.

The objectives of the experiment at Orofino are to determine the efficacy of livestock trampling for varying lengths of time on incorporation of seed and subsequent stand establishment. Picloram at 0.4 kg/ha was applied to a 0.4 ha site in the spring of 1981, and the area was continuosly grazed at a rate of 3.75 AUM per ha (1 cow and 2 calves). On September 30, 1981, 18 kg of intermediate wheatgrass seed was cyclone-seeded over the site. Four exclusion cages were randomly established at the time of seeding and at 8-day intervals a one month period thereafter. The soil remained dry during this period. Establishment and productivity evaluations will be made for three consecutive years. (Idaho Agricultural Experiment Station, Moscow, ID 83843)

Effect of maturation on viability and germination of yellow starthistle seed buried at 3 depths. Sheley, R. L., Huston, C. L., R. H. Callihan and D. C. Thill. A study of the influence of seed maturation on the viability and germination of yellow starthistle is currently underway. Yellow starthistle (Centaurea solstitialis) seed was collected in late August near Lewiston, Idaho. This collection was separated into plumed and plumeless seed. Four replications of 250 seeds of each type were placed in nylon mesh packets and buried on October 5, 1981 in a sandy loam soil with a mean annual precipitation of 25-30 cm. Seeds were buried at 2 cm, 8 cm, and 13 cm. Seed viability will be tested for fourteen retrieval dates over a ten year period.

PROJECT 3

UNDESIRABLE WOODY PLANTS

Raymond A. Evans - Project Chairman

Control of unwanted trees with basal applications of undiluted triclopyr ester. Warren, L. E. Basal applications of 2,4,5-T or silvex ester have been used at 3.6 to 5.4 kg. a.i. in oil per 380 l. of solution to kill hardwoods. A triclopyr ester formulation, GARLON 4 Herbicide has been introduced recently and is effective at 1.8 to 3.6 kg. a.i. per 380 l. in oil. To alleviate the problem of carrying excessive amounts of oil and a 16 to 20 l. backpack over hilly and difficult terrain, GARLON 4 Herbicide was applied undiluted or diluted in an equal amount of diesel oil to provide coverage of multiple stems from resprouting hardwoods such as bigleaf maple.

Basal applications of GARLON 4 Herbicide were made with a spotting gun or window·washing bottle in a thin stream horizontally to individual trees. Maple trees, 5 to 10 cm. in diameter, were treated in June, 1980 and tanoak trees 2 to 8 cm. in diameter were treated in September, 1980 at the rate of 8 to 24 ml. per stem. Two year old bigleaf maple clumps with 10 to 30 stems per clump were treated in March, 1981 with 25 to 75 ml. of GARLON 4 Herbicide per clump. The sprays were directed horizontally into the clumps from all sides and onto horizontal stems which extend from the main trunk. Silver maple trees up to 10 cm. in diameter with several basal sprouts were treated basally with 12 to 18 ml. of GARLON 4 Herbicide in February and May, 1981. In all cases there were 5 to 10 replications per treatment and a standard treatment with GARLON 4 Herbicide at 1.8 kg. a.i. per 380 l. oil (1% solution) was used for comparison.

The original bigleaf maple trees treated with 12 ml. GARLON 4 Herbicide per stem in June, 1980 appeared to be dead in September, 1980; they failed to sprout by July, 1981 and appeared dead to the roots similar to the kill with the normal basal treatment. The silver maple trees treated in February and May with 12 ml. of GARLON 4 Herbicide per stem were dead in late September.

The bigleaf maple clumps treated with GARLON 4 Herbicide at 25 ml. per clump in March, 1980 had over 45% kill and no resprouting compared to 93% kill with GARLON 4 Herbicide at 1% in oil. There was no benefit from adding an equal volume of oil although complete coverage of all stems in a clump was impossible with 25 to 50 ml. of solution.

The treatments with GARLON 4 Herbicide at 16 ml. per tree on tanoak in September, 1980 gave 100% top kill with no resprouting in September, 1981; there were a few green leaves on some of the larger trees treated with 24 ml. of GARLON 4 Herbicide per clump. GARLON 4 Herbicide at 1% in oil applied in June, 1980 gave 90% top kill. Tanoak trees 2 to 9 cm. in diameter treated in June, 1981 with 10 to 30 ml. per stem had 71% to 92% top kill in October, 1981.

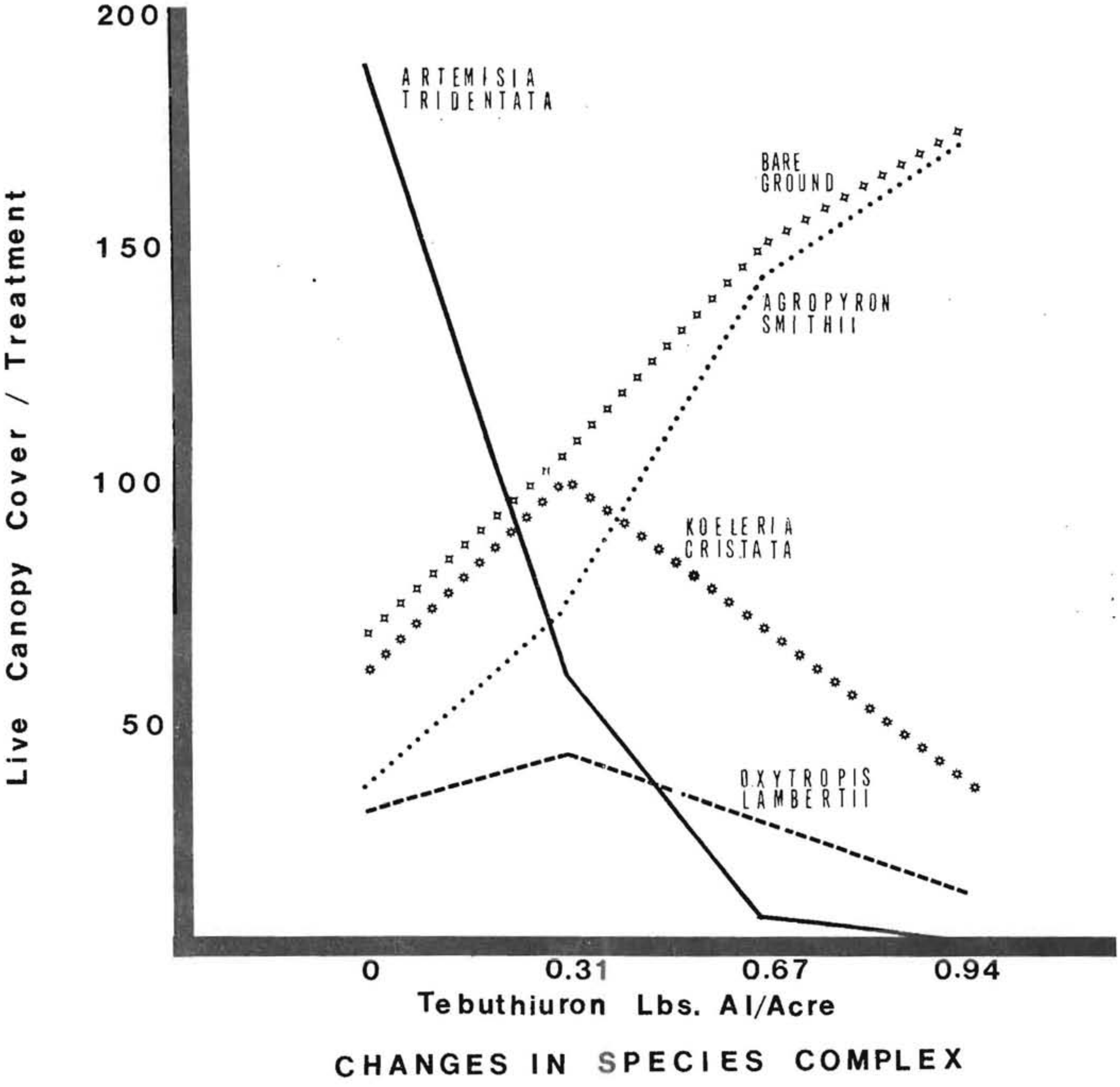
Thick resprouts of bigleaf maple about 3 years after cutting, treated with 37.5 to 50 ml. of GARLON 4 Herbicide per clump in July, 1981 had 90 to 95% top kill in October, 1981. A block of bigleaf maple trees 2 to 15 cm. in diameter with a few cascara, madrone, dogwood, hazel and oceanspray was treated in July, 1981 with 2 to 12 ml. of GARLON 4 Herbicide per stem depending on size. By October 9, 1981 all trees under 10 to 12 cm. in diameter had 95 to 100% top kill.

This method of application promises to greatly improve the logistics of applying GARLON 4 Herbicide basally. The cost of herbicide plus oil may be slightly less than for the undiluted GARLON 4 Herbicide, but the cost of application will be much less for the latter. More data are needed on other common species, the rate versus tree size and season effect. (The Dow Chemical Company, Route 1, Box 1313, Davis, CA 95616).

Effects of tebuthiuron on range species complex and forage production. Whitson, T. D. and H. P. Alley. Big sagebrush control has resulted in an average of two- to threefold increases in range grass production when 2,4-D [(2,4-dichlorophenoxy) acetic acid] has been used for control.

Experimental plots were established November 7, 1978, near Ten Sleep, Wyoming, on sagebrush infested rangeland to evaluate the potential of tebuthiuron as a chemical control method. Three rates of 20% granular material, 0.31, 0.67, 0.94 lb ai/A, were aerially applied to plots of 11.23 acres. Forage species were clipped randomly from five, 4.9 sq ft circular quadrats and oven dried. Yields from the 0, 0.31, 0.67 and 0.94 lb ai/A, tebuthiuron treatments were: 308, 382, 715 and 552 lb/A, respectively.

Live canopy cover was determined August 4, 1981, for each herbicide rate using 400 random points. Comparisons show changes in species live canopy cover at four rates of the herbicide treatment. The most important range forage species, western wheatgrass, increased 397% in live canopy cover compared to the untreated control. Sagebrush defoliation for the 0.31, 0.67 and 0.94 rates of tebuthiuron was 69, 96 and 99.5%, respectively. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1141).



Changes in live canopy cover resulting from tebuthiuron applied at 0, 0.31, 0.67 and 0.94 lb ai/A, approximately three years after application

Response of three range grass species to tebuthiuron. Whitson, T. D. and H. P. Alley. Tebuthiuron has shown promise as a chemical method of controlling big sagebrush; however, specific grass species growing in association with the sagebrush have shown considerable sensitivity to the chemical. A greenhouse experiment was established to evaluate the tolerance of three grass species to rates of tebuthiuron which might be used for sagebrush control.

Fifty grass transplants of green needlegrass, western wheatgrass and needleandthread were transplanted into 6-inch pots and moved to the greenhouse in August, 1980. Plants were clipped to 50 mm height and treated with tebuthiuron at 0, 0.25, 0.50, 0.75 and 1.0 lb ai/A on January 6, 1981. The plots were clipped at 82-day intervals, oven-dried and weighed.

All grasses receiving the 0.75 and 1.0 lb ai/A treatments were chlorotic for approximately 160 days following treatment after which time they recovered. Six of the western wheatgrass plants and four of the needleandthread plants receiving the 1.0 lb ai/A died and one Western wheatgrass plant receiving the 0.75 lb ai/A died.

Western wheatgrass yields, on the loamy sand soil, were significantly lower at the 0.75 and 1.0 lb ai/A rates, than the 0, 0.25 and 0.50 rates. Other species showed no consistent patterns of yield differences. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1142).

Grass species and dry weight production

Plant Species	Clipping date 1981	Forage, oven-dry wt., mg/190cm ^{2}				
		Tebuthiuron lb ai/A[4]				
		0	0.25	0.50	0.75	1.0
Green needlegrass[1]	Mar. 3	163c[4]	182c	269bc	386ab	463a
	June 6	705a	809a	1169a	682a	701a
	Sept. 9	931a	1325a	1265a	920a	708a
Western wheatgrass[1]	Mar. 3	511a	332a	502a	563a	281a
	June 6	468ab	473ab	574a	175b	231ab
	Sept. 9	528a	438a	572a	503a	416a
Needleandthread grass[2]	Mar. 3	252a	418a	488a	376a	316a
	June 6	327a	305a	1019a	674a	143a
	Sept. 9	608a	549a	1100a	528a	673a
Western wheatgrass[2]	Mar. 3	1566bc	2354a	2072ab	1245c	1120c
	June 6	4035a	3691a	5336a	1756b	1271b
	Sept. 9	5436a	3849b	4148ab	2268c	2136c
Western wheatgrass[3]	Mar. 3	1207a	1026ab	703b	794b	659b
	June 6	1062a	1692a	1565a	821a	1307a
	Sept. 9	2278a	2657a	2672a	1503a	2361a

[1]Soil characteristics: loam, organic matter - 3.1; pH - 7.4; 47.2% sand, 31.6% silt, 21.2% clay.
[2]Soil characteristics: loamy sand, organic matter - 2.3; pH - 7.3; 79.6% sand, 10.6% silt, 9.8% clay.
[3]Soil characteristics: sandy loam, organic matter - 1.7; pH - 6.9; 60.0% sand, 24.2% silt, 15.8% clay.
[4]Means in rows followed by different letters are significantly different at the 0.05 level, Duncan's New Multiple-Range Test. Treatment date was January 6, 1981.

Seasonal conifer tolerance to eight foliar herbicides. McHenry, W. B., P. Smith, S. R. Radosevich and N. L. Smith. A site near Orrick, Humboldt County, Calif. was selected to evaluate the response of Douglas fir, ponderosa pine and coast redwood seedlings to seasonal applications of asulam, 2,4-D (ester), dichlorprop, fosamine, glyphosate, silvex, 2,4,5-T (ester) and triclopyr (amine and ester). The area had been bulldozed of brush in the fall of 1975 following logging. Conifer seedlings (10 trees/species/plot) were planted in the spring of 1976. Fifteen herbicide treatments were applied over the top of the trees April 5, (breaking dormancy), June 19, (actively growing) and October 17, 1979 (following growth cessation) using a CO_2 backpack sprayer calibrated at 20 gpa. Four replications were employed with individual plots 10 by 20 ft. Surfactant (X-77) at 0.5% v/v was included with triclopyr amine and fosamine. Glyphosate and asulam were compared with and without a surfactant.

Conifer response was evaluated annually using height measurements and tree mortality. Douglas fir appeared tolerant to the phenoxy herbicides regardless of application date. Summer glyphosate and summer and fall treatments with 8 lb ai/A fosamine reduced fir stand approximately 50%. Ponderosa pine was severely affected by spring and summer applications of triclopyr and by summer and fall treatments of fosamine and glyphosate with a surfactant. Douglas fir and redwood appear more tolerant of triclopyr than does ponderosa pine. Silvex, 2,4,5-T and 2,4-D produced severe pine losses at the May date. Redwood was tolerant of silvex and dichlorprop applied in October, however fosamine and glyphosate reduced survival when applied summer or fall. (University of California, Cooperative Extension, Davis, CA 95616).

Conifer tolerance to foliar herbicides
% mortality (1981)

Herbicide	Ai/A	Douglas fir Apr.5	Douglas fir June 19	Douglas fir Oct.15	ponderosa pine Apr.5	ponderosa pine June 19	ponderosa pine Oct.15	redwood Apr.5	redwood June 19	redwood Oct.15
2,4-D lve	4 lb	2	10	5	24	59	0	11	24	6
2,4,5-T lve	4 lb	12	11	*	10	40	*	11	3	*
silvex	4 lb	13	16	*	7	30	*	42	22	*
dichlorprop	4 lb	2	2	0	2	7	0	40	38	0
triclopyr lve	2 lb	7	5	6	26	43	2	0	21	6
triclopyr lve	4 lb	2	13	2	81	83	16	2	10	0
triclopyr amine + surfactant	2 lb	1	13	3	100	74	15	14	0	12
triclopyr amine + surfactant	4 lb	11	26	0	100	89	30	16	20	17
fosamine + surfactant	4 lb	2	33	15	5	100	100	2	89	75
fosamine + surfactant	8 lb	5	54	44	29	85	98	12	75	84
glyphosate	2 lb	2	25	0	7	57	6	5	69	45
glyphosate	4 lb	0	44	5	4	51	14	10	70	72
glyphosate + surfactant	2 lb	3	59	8	2	92	53	7	0	84
asulam	4 lb	0	3	0	2	2	5	9	3	6
asulam + surfactant	4 lb	0	32	*	14	5	*	24	14	*
control	-	8	11	4	0	25	5	12	25	7

* not applied this date

PROJECT 4

WEEDS IN HORTICULTURAL CROPS

William Cobb - Project Chairman

Response of strawberries (fragaria ananassa duch.) to herbicides under a weed-free environment. Agamalian, H. S. Using herbicides on high valued crops requires optimum levels of selectivity. Several pre and post emergence herbicides were evaluated on recently established transplanted strawberries of the cultivar Aiko. The soil had been previously fumigated with a mixture of methyl bromide and chloropicrin at 450 lbs/A.

The replicated trials were sprayed 3 weeks after transplanting, the plants had 3-to-4 true leaves. Three days following treatment, a sprinkler irrigation of 1.0 inches of water was applied. A second irrigation followed 14 days later. Subsequent irrigation was by the drip system. The soil texture was a Chualar sandy loam consisting of 20% clay, 18% silt, 62% sand, and 1.7% O.M.

The following herbicides were applied in 50 gal/A volume spray: napropamide, dcpa, diphenamid, terbacil, chloroxuron, and phenmedipham. All herbicides were applied at a standard use rate or varying concentration. Three weeks after treatment, plastic mulch was applied to the treated area.

Subsequent observations of the strawberries for phytotoxicity were recorded during the course of crop growth. Fruit yields were collected for 12 weeks. These observations and yield data are presented in the following table.

Strawberry tolerance to napropamide was excellent at all three rates evaluated. No observed growth or yield differences were recorded. Phenmedipham, as a post emergence herbicide resulted in good crop tolerance although some leaf tissue necrosis at the 2 lb/A rate was noted. Yield differences were not observed from these treatments. Terbacil at 0.5 and 1 lb/A provided marginal strawberry tolerance. The 1 lb/A rate resulted in initial plant chlorosis, later recovery was evident, but plant growth was not as vigorous and yield differences were measured. (U.C. Cooperative Extension, Monterey County, 118 Wilgart Way, Salinas, CA 93901).

RESPONSE OF STRAWBERRIES TO SEVERAL PRE AND POST EMERGENCE HERBICIDES

TREATMENT	LB/A	3/14 CROP PHYTO	4/4 STRAWBERRY VIGOR	YIELD BERRIES GRAMS/PLOT	
napropamide	2	0.3	9.8	8591	E
napropamide	4	0.3	10	8681	E
napropamide	8	0	10	9162	EF
chloroxuron	2	0.7	9.3	5395	BCD
chloroxuron	4	2	9.6	5734	CD
phenmedipham	1	1	9.3	6824	DE
phenmedipham	2	0	10	7739	E
terbacil	0.5	3	7.6	4552	AB
terbacil	1	4	6.6	3225	A
diphenamide	4	0.3	9	8606	E
dcpa	8	2.5	10	6936	DE
control	0	1	9.3	7586	E

Selective weed control in artichokes (cynara scolymus) Agamalian, H. S.

The development of selective herbicides for the transplanting period and the control of wild oats are two major objectives with this crop.

Replicated trials were established to transplanted shoots. All herbicides were applied in 50 gal/A. Four replications were used in the experiment. Herbicides were applied using several rates and in combinations. The preplant treatments were incorporated 4-to-5 inches deep. Sprinkler irrigation followed treatment 1-to-2 days after planting. The soil was a Moro Cojo clay loam, consisting of clay 32%, silt 44%, sand 24%, organic matter 4.4%.

Herbicides included in these studies were pronamide, napropamide, diuron, and simazine. The results from these trials (table 1) indicated a high level of artichoke tolerance to pronamide, either preplant or post plant preemergence. Excellent wild oat control was obtained at 2 and 4 lb/A rates, as were common mustard, chickweed, and burning nettle. Its major weakness is with the compositae weeds, such as common groundsel and sow thistle.

Napropamide, at 2 and 4 lb/A exhibited good selectivity post plant preemergence. The preplant incorporated treatments, at 8 lb/A caused inhibition of artichoke growth. Acceptable weed control was evident on wild oats, common groundsel, sow thistle, and cheeseweed.

The two currently registered herbicides, diuron and simazine were included as standards and in combinations. Both of these herbicides caused reduced crop growth under preplant conditions. Preemergence selectivity in combinations with pronamide and napropamide were acceptable at rates tested.

Combinations of pronamide with napropamide provided excellent weed control and maintains good crop selectivity under post transplant preemergence conditions.
(U.C. Cooperative Extension, Monterey County, 118 Wilgart Way, Salinas, CA 93901).

EFFICACY DATA WITH SEVERAL PREEMERGENCE HERBICIDES ON GLOBE ARTICHOKE

		WEED CONTROL					YIELD ARTICHOKES
TREATMENT	LB/A	burning nettle	chick-weed	mus-tard	common groundsel	wild oats	LBS/A
pronamide	2	10	8	9	3	9	5,290
pronamide	4	10	9	10	5	10	4,590
pronamide	8	10	10	10	6	10	4,240
napropamide	2	9	9	3	7	8.5	4,680
napropamide	4	10	10	5	9	10	4,350
pronamide + napropamide	2+2	10	10	9	7	10	4,470
pronamide + simazine	2+1	10	10	10	5	10	4,235
pronamide + diuron	2+1	10	10	10	4	10	4,320
control	0	0	0	0	0	7	3,028
control (weeded)	0	8	9	8.5	8	0	4,710

The control of simazine tolerant senecio vulgaris in established asparagus
Agamalian, H. S. The continuous use of simazine in 10-year-old asparagus plantings has resulted in uncontrolled populations of common groundsel.

A location was selected where no herbicides were used the previous year. The experiment was established on a sandy loam soil with 18% clay, 20% sand, 62% silt, and 2.4% O.M. Herbicides used in this study were simazine, diuron, linuron, napropamide, terbacil, trifluralin, metribuzin, and hexazinone. The two standard herbicides simazine and diuron were applied at single rates, remaining herbicides were applied at multiple dosages. Four replications were treated with each being 125 sq. ft. All herbicides were applied to recently tilled beds with the asparagus in a dormant condition. Trifluralin was incorporated 3-to-4 inches deep. Rainfall (1.1 inches) within 3 days was used to initially activate the herbicides. Subsequent spring rains totaling 7.8 inches were recorded from January through April.

The results from these trials (table 1) indicated no weed control with simazine. Herbicides providing maximum common groundsel control were evident with all rates of terbacil and hexazinone. The minimum rate of napropamide provided early season control, but did not sustain effective control as the maximum rate did. Metribuzin activity at this site was not effective at the lower dosages. Trifluralin did not provide acceptable control at either rate. The single rate of diuron resulted in partial common groundsel control, heretofore, not normally observed with this specie. Results from linuron also exhibited unusual good control of simazine resistant common groundsel.

The following data indicates the yield results from one season's harvest. Herbicide phytotoxicity was not evident with any of the treatments. Some significant differences were measured in the respective yield data; also harvest worker efficiency is impaired during the process of spear selection from this weed. (U.C. Cooperative Extension, Monterey County, 118 Wilgart Way, Salinas, CA 93901).

SENECIO VULGARIS CONTROL AND YIELD OF ASPARAGUS SPEARS

TREATMENT	ACTIVE LB/A	PERCENT CONTROL COMMON GROUNDSEL	YIELD (SPEARS) LBS/PLOT	
1. diuron	2	56	486	DEF
2. hexazinone	0.5	98	432	CDE
3. hexazinone	1	100	397	ABCD
4. hexazinone	2	100	429	BCDE
5. linuron	2	80	408	ABCD
6. linuron	4	98	487	EF
7. metribuzin	0.5	0	358	A
8. metribuzin	1	12	461	CDEF
9. metribuzin	2	35	448	CDE
10. napropamide	4	45	403	ABCD
11. napropamide	8	60	462	CDEF
12. simazine	2	0	386	ABCD
13. terbacil	1	90	524	F
14. terbacil	2	100	490	EF
15. trifluralin	2	22	439	CDE
16. control	0	0	341	A
17. control (hand-weed)	0	90	448	CDE

Evaluation of broadleaf post emergence herbicides for onions (allium cepa l.) Agamalian, H. S. and E. A. Kurtz. The limitations of currently registered pre and post emergence herbicides for onions continues to restrict chemical weeding. Broadleaf weed control in the early stages of onion development is essential so as to reduce crop-weed competition.

Trials were established on direct-seeded onions previously treated with dcpa. Two cultivars of onion were used, Australian Brown and White Globe, processor type. Applications of the herbicides were made in 50 gal. volume per acre. The onions were treated in the 1-to-2 leaf stage, using four replications.

Indigenous broadleaf weeds were treated which included shepherd's purse (Capsella bursa-pastoris L.), common groundsel (Senecio vulgaris L.), burning nettle (Urtica urens L.), purslane (Portulaca oleracea L.), sow thistle (Sonchus oleraceus L.), and cheeseweed (Malva parviflora L.).

Herbicides included in these trials were bromoxynil, oxyflurofen, acifluorfen, nitrofen, and bifenox.

Evaluation of onion selectivity was compared with the standard nitrofen. Bromoxynil at 0.25-to-0.6 lb/A resulted in good onion selectivity at this stage. Oxyflurofen at 0.125-to-0.25 lb/A showed acceptable onion tolerance. Acifluorfen at 0.50-to-1.0 lb/A did not show adequate crop selectivity, as severe stand losses were recorded. Bifenox at 2 lb/A + 4 lb/A provided acceptable onion tolerance.

Weed control results indicated narrow limits between dosage used and the size of the weeds. Bromoxynil was extremely effective on common groundsel, sow thistle, and shepherd's purse. Oxyflurofen and acifluorfen controlled shepherd's purse, purslane, cheeseweed, and burning nettle. Bifenox was effective in controlling cheeseweed, burning nettle, and purslane, but did not control common groundsel or sow thistle.

The following tabulated data indicates specific weed control and crop yields. (U.C. Cooperative Extension, Monterey County, 118 Wilgart Way, Salinas, CA 93901 and Basic Vegetable Corp., King City, CA 93930).

TABLE 1. BROADLEAF WEED CONTROL IN ONIONS

		PERCENT WEED CONTROL					
TREATMENTS	LB/A	shepherd's purse	common groundsel	burning nettle	purslane	sow thistle	cheeseweed
bromoxynil	0.25	9.5	9.5	9	8	9	2
bromoxynil	0.33	10	10	10	8.5	10	3
bromoxynil	0.66	10	10	10	9	10	3
oxyflurofen	0.25	8.5	7.5	10	10	9	10
oxyflurofen	0.50	9	9	10	10	10	10
acifluorfen	0.25	9.5	9	10	10	10	10
acifluorfen	0.5	10	10	10	10	10	10
acifluorfen	1	10	10	10	10	10	10
bifenox	2	5.5	3	9.5	10	4	10
bifenox	4	6	5	10	10	6	10
nitrofen	4	5	4	9.5	10	5	10
chloroxuron	2	8.5	9	9	9	4	9
bromox. + chlorox.	.25+2	10	10	10	10	9.5	10
control	0	0	0	0	0	0	0

TABLE 2. RESPONSE OF ONIONS TO SEVERAL BROADLEAF POST EMERGENCE HERBICIDES

		ONION SELECTIVITY		
TREATMENTS	LBS/A	CROP PHYTO 5/12	STAND/100" 7/11	ONION YIELD BULBS/AC
bromoxynil	0.25	2.5	258	36,940
bromoxynil	0.33	3.0	245	37,801
bromoxynil	0.50	4	244	37,630
oxyflurofen	0.25	2	225	36,981
oxyflurofen	0.50	2.7	260	36,485
acifluorfen	0.25	4.2	235	38,800
acifluorfen	0.50	8.5	111	31,360
acifluorfen	0.75	10	39	120
bifenox	2	3.2	222	37,410
bifenox	4	3.2	250	36,890
nitrofen	4	0.5	250	37,450
chloroxuron		1.7	253	37,255
bromox. + chlorox.	0.25+2	2.2	233	37,905
control	0		253	36,080

Preemergence herbicides for direct-seeded onions (allium cepa l.) Agamalian, H. S. and E. A. Kurtz. Selective weed control in onions requires a sequential use of preemergence and post emergence herbicides. With direct-sown onions in California, dcpa is generally used as a preemergence application.

Evaluations of propachlor as a candidate herbicide for tank mixes was established on white globe-type processor onions. The trials were established on two types of soil; (clay loam, sand 36%, silt 32%, clay 32%, O.M. 0.5%, and a sandy loam with sand 66%, silt 20%, clay 14%, O.M. 0.8%). Both of these trials were grown under sprinkler irrigation. Four replications were used, with herbicides being applied in 50 gal/A volume spray.

The results of these trials (table 1) indicated an increase in broadleaf weed control when the two herbicides were mixed together. This was especially so with common groundsel (Senecio vulgaris) and shepherd's purse (Capsella bursa-pastoris). Both herbicides controlled purslane (Portulaca orleracea L.) and burning nettle (Urtica urens L.). On the clay loam soil 4 lb/A plus dcpa at 10 lb/A provided excellent weed control. At the sandy loam site, propachlor at 2 lb/A in the combination was adequate.

Propachlor's selectivity to onions appears to be related to soil adsorptive factors. Rates of 8 lb/A on the clay soil resulted in good crop selectivity; whereas the same treatment on sandy soil caused severe reduction of onion stand. It appeared that a use rate of 2-to-4 on sandy soil would be acceptable, whereas a 4 lb/A rate of propachlor would be needed on a clay loam soil.

The results of these trials indicated efficacy advantage in the use of propachlor in combination with dcpa for direct-sown onions. (U.C. Cooperative Extension, Monterey County, 118 Wilgart Way, Salinas, CA 93901).

TABLE 1. WEED SENSITIVITY TO PREEMERGENCE HERBICIDES

TREATMENTS	LB/A(ai)	PERCENT WEED CONTROL[a] shepherd's purse	common groundsel	purslane	burning nettle
1. dcpa	10	0	0	100	90
2. propachlor	2	52	82	85	85
3. propachlor	4	90	98	95	90
4. propachlor	8	100	100	100	100
5. dcpa + propachlor	10+2	75	85	100	100
6. dcpa + propachlor	10+4	95	100	100	100
7. dcpa + propachlor	10+8	100	100	100	100
8. control	0	0	0	0	0

a = mean of two locations

TABLE 2. ONION TOLERANCE TO PREEMERGENCE HERBICIDES

TREATMENTS	LB/A(ai)	Onion Selectivity[b] sandy loam	clay loam	Onion Yield Bulb lb/A sandy loam	clay loam
1. dcpa	10	0	0	38,229 BC	41,820 B
2. propachlor	2	0	0	38,108 BC	41,470 B
3. propachlor	4	1	0	36,780 AB	41,123 B
4. propachlor	8	5	0	30,141 A	43,214 B
5. dcpa + propachlor	10+2	0	0	39,100 BC	41,820 B
6. dcpa + propachlor	10+4	2	0	35,780 AB	41,123 B
7. dcpa + propachlor	10+8	5	1	29,875 A	43,214 B
8. control	0	0	0	31,045 A	33,107 A

b = no effect = 0, max. injury = 10

Selective weed control in garlic (allium sativium l.) Agamalian, H. S. and E. A. Kurtz. Weed control in garlic as it is grown in California brackets several weed germinating periods. The crop is fall planted from cloves, it develops vegetatively in the spring and is harvested late summer.

Freedom from weeds is critical in all three periods, especially during harvest as bulb recovery is related to the absence of weeds.

Weed control programs currently use preemergence and post emergence herbicides. The recent registration of bromoxynil has enhanced post emergence weed control. The withdrawal of nitrofen has necessitated the need for additional herbicide evaluations.

Preemergence trials were established following clove planting using oxyflurofen, bensulide, chlorpropham, and dcpa. Sprinkler irrigation (1.2 inch) was applied 3-to-4 days following treatment. Post emergence trials were applied to garlic when the plants had 1-to-2 true leaves. Herbicides applied at this stage were oxyflurofen, bromoxynil, nitrofen, acifluorfen, chloroxuron and difenzoquat. Four replications were used in the trials, with spray applications made in 50 gal/A volume. The soil texture was a Lockford clay loam, 32% clay, 37% silt, 31% sand, and 2 % O.M. The early stages of irrigation were sprinkler and rainfall. Crop observations, weed control, and yield data were obtained from the experiment.

Early crop symptoms were observed from preemergence applications of oxyflurofen at the higher rates. Bensulide, dcpa, propachlor, and chlorpropham treatments did not result in any stand or crop symptoms.

Post emergence application of oxyflurofen resulted in some leaf tip bleaching. This was evident at 0.5 lb/A and higher rates. Similar symptoms were observed with aciflurofen at all rates tested. The maximum rate of difenzoquat resulted in some garlic vigor suppression.

Weed control data (table 2) was collected on the following weeds: cheeseweed (Malva parviflora L.), shepherd's purse (Capsella bursa-pastoris), and common groundsel (Senecio vulgaris).

Results from these trials indicated good crop selectivity with bensulide, but marginal selectivity with oxyflurofen as preemergence treatments. Post emergence activity of oxyflurofen would indicate additional testing is required. (U.C. Cooperative Extension, Monterey County, 118 Wilgart Way, Salinas, CA 93901 and Basic Vegetable Corp., King City, CA 93930).

TABLE 1. GARLIC RESPONSES TO SEVERAL PREEMERGENCE HERBICIDES

TREATMENT	LB/A	CROP PHYTO	PLANTS/ BED FT.	YIELD LBS/A
propachlor	2	0.8	13.1	13,390
propachlor	4	1	12.7	12,880
propachlor	8	1	12.7	13,650
bensulide	4	1.2	14.1	14,200
bensulide	8	1.2	11.8	13,230
dcpa	10	1.2	12.2	12,320
chloropropham	4	1.5	13.1	12,860
oxyflurofen	0.25	2.7	12.6	12,830
oxyflurofen	0.5	2.7	11.8	12,400
control	0	0.7	11.6	13,810

TABLE 2. GARLIC RESPONSES TO SEVERAL POST EMERGENCE HERBICIDES

TREATMENT	FORMULATION	LB/A	Weed Control 2/27	Crop Vigor 4/15	Yield LBS/A
nitrofen	E.C.	2	9.5	8.2	15,900
nitrofen	E.C.	4	9.0	8.0	15,880
nitrofen	W.P.	2	8.2	9.0	15,390
nitrofen	W.P.	4	8.0	8.2	15,920
oxyflurofen	E.C.	0.125	10	8.0	15,830
oxyflurofen	E.C.	0.25	10	7.5	15,810
oxyflurofen	W.P.	0.125	9	7.5	15,120
oxyflurofen	W.P.	0.25	9.7	7.5	15,880
bromoxynil	E.C.	0.5	9.5	8.7	16,340
difenzoquat	E.C.	1	0	9.5	15,900
difenzoquat	E.C.	2	0	8.7	15,250
control	.	0	0	9.2	15,120

Postemergence herbicide treatments for weed control in onions. Anderson, J. L. In an effort to find an effective alternative to the use of nitrofen on onions should nitrofen become unavailable postemergence herbicide treatments were applied to 'Red Ruby' onions in 1981. Herbicides were applied with a bicycle sprayer April 30 when the onions were in the first true leaf stage. Herbicides were applied at 40 lb pressure in 22 gpa of water. In 1980 the field was double cropped producing peas followed by green beans. Both crops were treated with trifluralin. This cropping history had an influence on the natural weed population. Predominant weeds were shephardspurse and hairy nightshade; also present were lambsquarters, redroot pigweed, and wild buckwheat.

As there were few grassy weeds in the natural population diclofop and RO 13-8895 showed very little weed control. Oxyfluorfen at 1/4 lb ai/A and PPG 844 at 1/5 lb ai/A provided excellent weed control. Oxyfluorfen caused a slight necrotic flecking on the onion leaves and both herbicides caused some twisting of the treated leaves. Symptoms were transient, however, and caused no lasting injury. All plots were hand weeded in July. Effect of treatments on bulb size was not significant. (Plant Science Department, Utah State University, Logan, UT 84322.)

Effect of postemergence herbicide treatments on onion weed control

Treatment[1]	Rate (lb ai/A)	Weed Control[2] (June 9, 1981)	Yield [Weight (lbs)/100 bulbs]
Chloroxuron	2.0	65	20.8
Diclofop	1.0	25	21.0
Oxyfluorfen	0.125	81.3	21.5
Oxyfluorfen	0.25	97	23.2
PPG 844	0.2	86.3	25.7
RO 13-8895	1.0	35	21.2
Untreated	---	0	21.2

[1]Applied April 30, 1981 to 'Red Ruby' onions at the first true leaf stage.

[2]Rated as percent weed control by visual observation prior to hand weeding of all plots. Predominant weeds were shephardspurse, hairy nightshade, lambsquarters, redroot pigweed, and wild buckwheat.

Evaluation of bensulide for preemergence weed control in onions. Bell, C. E. Bensulide (O,O-diisopropyl phosphorodithioate S-ester with N-(Z-mercaptoethyl) benzenesulfonamide) was evaluated for efficacy and phytotoxicity in a field trial of bulb onions under desert conditions. Application of bensulide was made at 4, 6 and 12 lb ai/A both preplant incorporated and surface applied after planting (preemergence). Mechanical incorporation was with a power tiller set at a 2 inch depth. Application was made with a CO_2 pressurized plot sprayer at 30 gallons per acre of water. Plot size was 2 beds by 25 feet, replicated 4 times. Germination of the onions was with 2 inches of water by sprinklers.

Results are presented in the following table. Bensulide appears to have marginal safety to onions. Further trials will evaluate bensulide effects on yield. (University of California Cooperative Extension, El Centro, CA. 92243).

Treatments	Rate (lb ai/A)	% Weed Control	% Phytotoxicity
1. Bensulide	4*	40	2.5
2. Bensulide	6*	47.5	2.5
3. Bensulide	12*	72.5	20
4. Bensulide	4†	82.5	0
5. Bensulide	6†	95	15
6. Bensulide	12†	97.5	42.5
7. Untreated Control		0	0

* Preplant incorporated
† Preemergence

Evaluation of metham as a spray blade incorporated treatment for weed control in processing tomatoes. Clement, L. D., R. Mullen, and A. H. Lange. Metham has been an effective soil fumigant in processing tomatoes for some time. Only recently has its use as a weed control chemical in tomatoes been explored. Nightshade infestation has been an annual problem in most Northern California tomato fields, and the purpose of this study was to evaluate an efficient method to control adequately nightshade species, specifically, black nightshade.

Using the spray blade application technique, a 12 inch wide band of metham was placed at 2 depths, 2 inches and 4 inches, in preformed 60 inch tomato beds. Three rates, 25, 50, and 100 gallons per acre, were applied along with a comparison power incorporated treatment of 4 lb/A of napropamide plus pebulate at 6 lb/A and an untreated check. The plot was planted to the variety VF 145B-7879, 21 days after treatment.

The 25 gallon rate of metham provided inadequate control of black nightshade and pigweed, but good control of summer grasses. Application depth had no influence on weed control, and crop phytotoxicity was slight.

The 50 gallon application gave excellent control of all weeds present; however, crop phytotoxicity increased at the 4 inch depth. The 100 gallon rate was too severe on the tomato plants although weed control was excellent.

The depth of application and the soil moisture conditions appear to be of prime concern when using this method. At the time of application, surface soil moisture (2 inches) was low and the possibility of loss of chemical due to volatilization was great.

At this time, the use of metham applied under similar conditions is not suggested. Nightshade and other weed species can be controlled effectively; however, crop phytotoxicity tends to increase with improved weed control. (University of California, Cooperative Extension, Solano County, 2000 West Texas Street, Fairfield, California 94533.)

Herbicides	Gal or lb/A	Spray blade Depth (inches)1/	Crop Vigor2/	Weed Control3/ Pigweed	Black Nightshade	Summer Grasses
Metham	25	2	8.3	3.3	6.0	8.0
Metham	25	4	7.5	5.5	7.3	8.0
Metham	50	2	8.3	5.8	7.0	9.0
Metham	50	4	6.0	7.3	9.3	8.5
Metham	100	2	4.5	9.0	9.5	9.5
Metham	100	4	2.8	9.8	10.0	9.5
Pebulate+ Napropamide	6+4	2	10.0	8.3	3.0	8.5
Check	-	-	10.0	0.0	0.0	0.0

1/ Treatment applied by power incorporation.
2/ Crop vigor where 0 = no stand and 10 = vigorous growth.
3/ Weed control where 0 = no control and 10 = complete control.

Herbicide evaluations for weed control in broccoli. Collins, R. L. and P. Kloft. Seven herbicides were evaluated in Futura variety broccoli planted June 19, 1981 at Scholls, Oregon. The broccoli was seeded one half inch deep, in four rows fifteen inches apart in each bed. The broccoli was thinned July 9, 1981 approximately 13 inches apart in each row. Potash was broadcast PPI at 100 lbs/A. 13-39-0 fertilizer was banded 2 inches under the row at 300 lbs/A. Urea was broadcast at thinning time at 200 lbs/A. Lorsban 15 G insecticide was banded over the row at planting time for maggot control. Pydrin and Monitor insecticides were applied three times for insect control. Barnyard grass was drilled into each plot on June 20, 1981. All plots were hand hoed on July 25, 1981.

The plot size was 6.5 ft. by 15.4 ft. or 100 sq. ft. replicated four times in a randomized block design experiment. The silt loam soil had a pH of 6.3 and organic matter of 2.1 percent. The soil contains 22% sand, 59% silt, and 19% clay. The first sprinkler irrigation of .64 acre inches of water was on June 20, 1981. The area received eight irrigations for a total of 11.04 acre inches of water. The total rainfall between treatment and final harvest was .26 inches.

The PPI treatments were applied on June 19, 1981. Trifluralin and pendemethalin were rototilled three inches deep. Napropamide was raked one inch deep. The pre emergence treatments were applied June 20, 1981. The post emergence treatments were applied July 17, 1981. All treatments were applied with a CO_2 powered boom sprayer with four by 8003 nozzels at 30 psi and 54 gpa water. Stand counts were taken after thinning. Crop tolerance and weed control visual evaluations were made on July 17, 1981, except for the post emergence treatments, which were rated on July 25, 1981. The first harvest cutting occurred on August 26, 1981, 76 days after planting. Three additional cuttings were taken on September 1, 7, and 14, 1981. Yields were ungraded.

Pendimethalin applied pre-emergence gave unacceptable crop injury. Diclofop and BAS 9052 OH herbicides gave no broadleaf weed control but excellent post emergence grass control. No phytotoxicity was observed with these two treatments, however weed competition reduced the yields of the broccoli. Pendimethalin gave good crop tolerance and weed control when applied PPI. Napropamide had good crop tolerance but was weak on broadleaf weed control. Grass control was good at rates above 2.0 lb/A. DCPA and DCPA plus napropamide combination gave good weed control and crop tolerance. Bensulide gave poor weed control but good crop tolerance. Bensulide plus napropamide combination gave fair to good weed control and good crop tolerance. Trifluralin standard herbicide gave good crop tolerance and weed control except for shepards purse. Trifluralin plus napropamide combination appeared to be somewhat less effective than trifluralin when applied alone. (Consulting Entomologist, Rt 2, Box 344, Hillsboro, Oregon 97123).

Herbicide evaluations for weed control in broccoli

Treatments	Rate lb/A	Type appl	Stand 1/ count	Crop 2/ injury	Weed Control 2/ Barnyard-grass	Shepards purse	Lambs-quarters	Pig-weed	Yield lbs 3/	Yield ton/A
Napropamide 50W	1.0	PPI	22.5	0	2.5	0	0.75	0	28.1	6.12
Napropamide 50W	1.5	PPI	24.5	0	4.25	0	3.0	2.75	25.7	5.59
Napropamide 50W	2.0	PPI	24.0	0	7.75	2.75	1.25	2.0	32.5	7.07
Napropamide 50W	4.0	PPI	21.25	0	8.5	5.75	7.5	6.0	27.9	6.07
Napropamide +	1.5 +									
trifluralin	0.75	PPI	24.0	0	7.0	4.25	7.5	7.25	27.6	6.01
Trifluralin 4E	0.75	PPI	25.0	0	9.6	3.6	10.0	10.0	28.4	6.18
Check	-	-	21.4	0	0	0	0	0	21.7	4.72
DCPA 75W	9.0	Pre	22.25	0	9.25	7.5	9.8	7.75	30.5	6.64
Napropamide +	1.5 +	PPI +								
DCPA	9.0	Pre	24.25	0	9.75	8.75	10.0	8.75	30.7	6.68
Bensulide 4E	6.0	Pre	22.75	0	2.25	0	0	0	23.7	5.16
Napropamide +	1.5 +	PPI +								
bensulide	6.0	Pre	19.5	0	7.75	3.75	9.6	8.75	28.1	6.12
BAS 9052 OH 1.53E	0.5 +									
+ Moract	1 qt.	Post	22.5	0	9.75	0	0	0	22.0	4.79
Diclofop 3E	0.75	Post	21.5	0	9.25	0	0	0	23.8	5.18
Pendimethalin 4E	0.75	PPI	18.75	0	9.25	5.25	9.25	8.5	26.7	5.81
Pendimethalin 4E	1.5	PPI	23.5	0.25	9.25	6.25	9.75	9.5	27.4	5.96
Pendimethalin 4E	1.0	Pre	8.0	7.75	9.75	9.5	10.0	9.25	9.1	1.98
Napropamide +	2.0 +	PPI +								
pendimethalin	1.0	Pre	6.3	6.6	9.6	9.5	10.0	9.3	10.5	2.28
Napropamide 50W	2.0	Pre	24.25	0	6.0	3.75	4.25	3.5	25.0	5.4

1/ number of plants per 30 ft of row
2/ 0 = no effect 10 = complete elimination
3/ yields lbs/100 sq.ft. from four cutting dates Aug. 26, Sept. 1, 7, and 14,1981.

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 the fall of 1980 and the spring of 1981 at Mesa, Arizona. On September 9, 1980 and February 5, 1981 preplant herbicides were applied to shaped beds and incorporated 3 inches deep with a rototiller-bedshaper. Six rows of white, sweet spanish onions were planted on each bed September 12, 1980 and February 6, 1981. On the same dates preemergence herbicides were applied to dry soil (sand 34%, silt 43%, clay 23%, organic matter 1%), and the onions were irrigated by watering every furrow. The first postemergence herbicides were applied September 29, 1980 and March 10, 1981 when onions had one-to-two leaves and weeds had a maximum of five true leaves. Selected plots received a second postemergence herbicide application on November 5, 1980 and March 23, 1981 when onions had two-to-four leaves and weeds were 3 to 8 inches tall. Weeds present in the fall test included Wright groundcherry, Palmer amaranth, junglerice and red sprangletop. Weeds present in the spring test included Southern giant curl mustard, common lambsquarters, nettleleaf goosefoot, narrowleaf goosefoot, tumble pigweed, littleseed canarygrass, wild barley and wild oat. Herbicides were applied in 40 gpa water, except sulfuric acid which was applied in 80 gpa water. Plots were two 40-inch wide beds, 15 feet long, and treatments were replicated four times. The spring test received 1.0 inch of rain February 9 and 0.8 inch of rain on March 2.

All herbicide treatments controlled broadleaf weeds in the fall test (Table 1). In the spring test, most treatments gave good early-season broadleaf weed control (Table 2). Treatments which consisted of preplant DCPA or bensulide followed by postemergence herbicides gave the best late-season control of broadleaf weeds. Two applications of bromoxynil also gave good broadleaf weed control. DCPA or bensulide gave very good control of annual grasses in both tests. Propham did not control red sprangletop, the primary grass species present in the fall test (Table 1).

DCPA caused more onion injury preplant incorporated than preemergence when both methods of application were followed by postemergence herbicides (Table 1). Observations indicated bensulide caused more onion injury preplant incorporated than preemergence, but differences were not as distinct as with DCPA. Two applications of 0.125 lb/A bromoxynil was more selective to onions and controlled weeds better than a single 0.25 lb/A application. Rainfall which occurred during the spring test may have enhanced preemergence herbicide activity and reduced selectivity to onions. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721.)

Table 1. Response of weeds and onions to preplant, preemergence, and post-emergence herbicides applied in the fall

Treatment			Percent control estimated				Yield marketable bunches per 10 ft. row
			Broadleaf		Grass		
Herbicide	Timing[1/]	lb/A or %	Oct.	Dec.	Oct.	Dec.	
DCPA/sulfuric acid	PP/PO-twice	8.0/5%	97	99	99	100	3
DCPA/sulfuric acid	PE/PO-twice	8.0/5%	98	100	97	95	15
Bensulide/sulfuric acid	PP/PO-twice	6.0/5%	95	100	100	99	17
Bensulide/sulfuric acid	PE/PO-twice	6.0/5%	95	100	100	99	23
Propham/sulfuric acid	PE/PO-twice	4.0/5%	95	100	53	88	19
DCPA/oxadiazon	PP/PO	8.0/1.0	99	98	100	100	2
DCPA/bromoxynil	PP/PO	8.0/0.125	97	90	99	99	1
Oxadiazon	PO	1.0	97	99	0	78	19
Bromoxynil	PO	0.25	97	93	30	80	7
Bromoxynil	PO-twice	0.125	97	100	0	69	12
Sulfuric acid	PO-twice	5%	95	98	0	70	12
DCPA/hand weed	PP	8.0	45	98	98	100	23

1/ PP = Preplant, PE = Preemergence, PO = Postemergence

Table 2. Response of weeds and onions to preplant, preemergence, and post-emergence herbicides applied in the spring

Treatment			Weed control and onion injury Percent estimated					
			Broadleaf		Grass		Onion	
Herbicide	Timing[1/]	lb/A or %	March	May	March	May	March	April
DCPA/sulfuric acid	PP/PO-twice	5.0/5%	89	75	97	98	14	14
DCPA/sulfuric acid	PE/PO-twice	5.0/5%	90	87	98	95	11	10
Bensulide/sulfuric acid	PP/PO-twice	5.0/5%	96	90	99	96	18	14
Bensulide/sulfuric acid	PE/PO-twice	5.0/5%	84	76	98	100	19	14
Propham/sulfuric acid	PE/PO-twice	4.0/5%	80	65	100	100	15	13
DCPA/oxadiazon	PE/PO	5.0/0.75	97	85	100	98	11	10
DCPA/bromoxynil	PE/PO	5.0/0.125	98	83	95	91	10	8
Oxadiazon	PO	0.75	95	69	96	86	7	5
Bromoxynil	PO	0.25	100	66	96	85	15	13
Bromoxynil	PO-twice	0.125	97	84	99	99	11	10
Sulfuric acid	PO-twice	5%	76	69	95	86	6	5
DCPA/hand weed	PP	5.0	71	88	93	100	10	8

1/ PP = Preplant, PE = Preemergence, PO = Postemergence

Weed control in head lettuce. Doty, C. H. and K. C. Hamilton. Herbicides were evaluated for weed control and crop selectivity in head lettuce in 1980 at Mesa, Arizona. On August 20 preplant herbicides were applied to flat soil and disc 3 inches deep. On August 22 pronamide was applied preplant over shaped beds and incorporated 3 inches deep with a rototiller-bedshaper. Two rows of Empire pelleted lettuce seed were planted on August 25. On the same day preemergence herbicides were applied and the lettuce was irrigated by watering every furrow. The lettuce was blocked to an 8-inch spacing, and the test was cultivated twice. Weeds present were common purslane, nettleleaf goosefoot, tumble pigweed, annual sowthistle, Wright groundcherry, red sprangletop and stinkgrass. Herbicides were applied in 40 gpa water. Plots were two 40-inch wide beds, 28 feet long, and treatments were replicated four times. Lettuce heads were harvested on November 19 and 26.

Balan gave good-to-excellent control of all broadleaf weeds except annual sowthistle. Propham did not control any weeds present in the test. Bensulide gave excellent control of common purslane and tumble pigweed. Preemergence applications of bensulide gave better control of nettleleaf goosefoot and annual sowthistle than did preplant applications. Pronamide gave excellent control of common purslane and Wright groundcherry and satisfactory control of tumble pigweed. All herbicides, except propham, controlled annual grasses. The best lettuce yields were produced by treatments of benefin, preplant disc and bensulide, preemergence. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721.)

Response of weeds and lettuce to preplant and preemergence herbicides

Treatment			Broadleaf weed control percent estimated in November				
Herbicide	timing[1/]	lb/A	common purslane	nettleleaf goosefoot	tumble pigweed	annual sowthistle	ground cherry
Benefin	PPD	1	95	83	100	46	89
Propham	PPD	4	0	0	0	20	71
Bensulide	PPD	6	96	53	95	59	78
Bensulide	PE	6	96	81	98	69	73
Pronamide	PPB	1	98	33	79	26	100
Pronamide	PE	1	100	43	73	56	100

Treatment			Grass weed control percent estimated in November		Lettuce yield
Herbicide	timing[1/]	lb/A	red sprangletop	stinkgrass	marketable heads per 52 ft. row
Benefin	PPD	1	100	100	37
Propham	PPD	4	63	63	2
Bensulide	PPD	6	100	100	26
Bensulide	PE	6	100	100	35
Pronamide	PPB	1	93	100	21
Pronamide	PE	1	100	100	18

1/ PPD = preplant disc, PPB = preplant incorporated over-the-bed, PE = preemergence

Screening new herbicides for trees, vines and five direct seeded crops. Lange, A. H. Although trees are not usually used in order to develop new herbicides, new numbered compounds, particularly those that look good in cotton soybeans, corn and small grains have been tested on young newly planted trees and vines in order to evaluate their potential for these crops. Napropamide, oxyfluorfen, oryzalin, norflurazon and glyphosate all had their beginnings in California for this program. Even with these new tools the tree and vine industries still have weed problems. Selective soil active herbicides for perennial weed control are needed. In addition to the perennials, there are several weed species resistant to our present selective preemergence herbicides. Some of these are flaxedleaved fleabane, marestail and spotted spurge. Puncturevine and late germinating grasses can also be problems in some orchards and vineyards.

This year's screening trial for trees and vines included only nine new number chemicals. These were applied on April 1, 1981 and irrigated in April 1 to 6. with a total of 1 inch of water. Most of these new herbicides looked safe on trees and vines; however, most did not give long enough control of summer grasses. The most effective new residual herbicide was R 40244. It is worthy of further evaluation. The most promising new postemergence herbicide was HO 00661. BAS 9052 was also very safe on the trees and broadleaf crops, but offered little residual control of grass. PPG 844 was quite effective on broadleaf weeds and safe on trees and vines. It may also have been safe on corn.

In addition, R 40244 appeared to have some possibilities on cotton.

Mon 4600 and Mon 097 gave good early weed control and appeared safe on trees, vines and corn.

Ortho 28236 gave questionable preemergence weed control and may have been phytotoxic on peach.

EL 500 caused severe stunting of all crops and weeds including controlling yellow nutsedge.

HO 00661 was very active postemergence on weeds and appeared very safe on trees with possible exception of almonds. It was toxic to the grapes, because they were low growing and, therefore, were sprayed almost "over the top" where as the trees, with exception of citrus, were tall and only the trunks were hit.

BAS 9052 was effective on all weeds except puncturevine and nutsedge. It was very safe on all trees and vines.

MBR 22359 was weak on all weeds and damaged most herbaceous crops. It also seemed to be quite active on trees and vines.

Dicamba gave fine broadleaf weed control, but was very toxic to trees and vines. It appeared to be least toxic on walnut and citrus. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Table 1. The effect of 14 herbicides on the control of 6 common weeds in an orchard screening trial (425-73-501-100-1-81)

		Average Weed Control 1/					
Herbicides	lb/A	Crab-grass	Other Grasses	Puncture-vine	Lambs-quarters	Pig-weed	Nut-sedge
Simazine	2	9.8	9.8	10.0	10.0	10.0	8.2
Oxyfluorfen +Oryzalin	2+4	10.0	10.0	10.0	10.0	10.0	5.8
PPG 844	1/2	1.8	1.8	10.0	6.8	10.0	7.5
PPG 844	2	7.5	5.0	10.0	10.0	10.0	7.5
R 40244	1	10.0	9.2	9.0	10.0	10.0	7.8
R 40244	.4	9.5	10.0	10.0	10.0	10.0	9.8
Mon 4600	3	9.0	7.0	3.0	7.5	3.5	10.0
Mon 4600	12	9.5	9.8	7.2	8.5	9.8	9.8
Mon 097	3	6.2	5.2	3.2	6.0	7.5	6.2
Mon 097	12	8.0	7.8	10.0	6.0	10.0	8.0
Ortho 28236	3	1.8	1.5	1.5	6.2	2.8	5.5
Ortho 28236	12	6.8	6.2	4.5	4.5	3.2	10.0
EL 500	1	5.5	6.2	10.0	7.5	9.5	10.0
EL 500	4	9.2	9.5	10.0	7.5	10.0	10.0
HO 00661	3/4	10.0	10.0	10.0	10.0	10.0	8.8
HO 00661	3	10.0	10.0	10.0	10.0	10.0	10.0
BAS 9052	1	9.2	9.2	4.0	7.8	7.5	2.8
BAS 9052	4	10.0	10.0	3.0	8.8	8.8	4.5
Dicamba	1/4	0.5	0.5	5.0	8.2	7.5	10.0
Dicamba	1	0.5	1.0	5.0	10.0	8.5	5.0
MBR 22359	1	3.2	1.5	3.8	4.2	8.2	8.5
MBR 22359	4	7.5	7.8	4.2	9.0	7.5	8.2
Check	-	9.2	5.2	6.0	7.5	10.0	10.0

1/ Average of 4 replications where 0 = no weed control and 10 = weed controlled or no weeds of the particular species listed present. Treated April 1 and evaluated June 9, 1981.

Table 2. Phytotoxicity rating on 5 annual crops in screening trial (425-73-501-100-1-81)

Herbicides	lb/A	Average Phytotoxicity Rating 1/ Corn	Melons	Cotton	Tomatoes	Alfalfa
Simazine	2	2.2	10.0	10.0	10.0	10.0
Oxyfluorfen +Oryzalin	2+4	8.8	10.0	9.5	10.0	10.0
PPG 844	1/2	0.8	10.0	7.5	6.8	9.2
PPG 844	2	4.5	10.0	5.2	10.0	10.0
R 40244	1	9.8	10.0	1.8	10.0	9.8
R 40244	4	10.0	10.0	10.0	10.0	10.0
Mon 4600	3	0.5	10.0	6.2	5.2	4.0
Mon 4600	12	8.2	10.0	9.2	9.5	8.8
Mon 097	3	0.0	8.8	5.0	7.5	3.0
Mon 097	12	3.8	10.0	9.8	10.0	8.2
Ortho 28236	3	0.0	5.0	5.0	6.8	0.5
Ortho 28236	12	5.0	10.0	6.8	9.8	0.0
EL 500	1	2.5	9.0	9.0	8.0	5.8
EL 500	4	4.8	10.0	10.0	10.0	9.2
HO 00661	3/4	7.0	10.0	4.0	4.8	4.8
HO 00661	3	7.0	5.0	10.0	0.0	2.0
BAS 9052	1	8.8	10.0	4.8	5.0	3.2
BAS 9052	4	6.0	10.0	7.5	3.0	4.8
Dicamba	1/4	3.8	10.0	7.0	4.5	2.5
Dicamba	1	4.0	10.0	5.0	5.5	2.5
MBR 22359	1	4.2	10.0	5.8	3.5	3.0
MBR 22359	4	7.5	7.5	7.5	6.8	4.8
Check	-	4.0	7.2	9.5	4.0	1.5

1/ Average of 4 replications where 0 = no phytotoxicity observed, healthy plants and 10 = no plant observed, plant dead. Treated April 1 and evaluated May 24, 1981.

Table 3. Relative phytotoxicity of new preemergence herbicides to 10 deciduous fruit crops (425-73-501-100-1-81)

Herbicides	lb/A	Average Phytotoxicity[1/] Almond	Pear	Walnut	Plum	Peach	Washington Navel on Rough Lemon	Washington Navel on Troyer	Ruby Seedless Grapes	Flame Seedless Grapes	Thompson Seedless Grapes
Simazine	2	0.2	0.0	0.0	1.5	2.8	0.0	0.0	3.0	2.2	1.5
Oxyfluorfen +Oryzalin	2+4	1.0	0.0	0.0	0.2	0.0	0.0	0.0	1.8	2.5	2.8
PPG 844	1/2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0
PPG 844	2	0.5	0.8	0.0	1.5	1.0	0.5	0.8	1.8	3.0	2.0
R 40244	1	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0
R 40244	4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.2
Mon 4600	3	2.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0
Mon 4600	12	2.2	0.0	0.0	0.0	3.0	0.0	0.2	0.0	2.5	0.0
Mon 097	3	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mon 097	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Ortho 28236	3	2.8	0.8	0.0	0.0	2.2	0.0	0.0	0.0	0.0	1.0
Ortho 28236	12	2.2	1.0	0.5	1.2	5.2	0.5	0.0	0.0	0.2	0.8
EL 500	1	2.8	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EL 500	4	4.0	0.5	0.0	0.2	0.8	2.5	0.0	0.5	0.0	0.8
HO 00661	3/4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	1.8
HO 00661	3	6.2	0.8	0.0	0.0	0.0	0.0	0.8	3.2	4.8	3.5
BAS 9052	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BAS 9052	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.8
Dicamba	1/4	4.2	1.8	2.0	3.2	3.2	0.0	1.2	1.5	1.8	3.0
Dicamba	1	9.8	6.2	3.8	5.8	8.8	2.5	4.5	8.5	7.8	7.8
MBR 22359	1	0.8	0.0	0.0	0.0	0.0	2.5	0.8	1.8	0.5	2.0
MBR 22359	4	7.8	2.8	2.5	5.5	3.5	1.5	1.5	5.5	5.0	7.5
Check	-	2.2	0.0	0.5	0.0	0.0	0.0	1.5	2.8	1.8	1.8

1/ Average of 4 replications where 0 = no phytotoxicity symptoms and 10 = tree dead. Treated April 1, and evaluated June 9, 1981.

The effect of activated carbon and the amount of metham and water for incorporation in wet versus dry soil on the germination of cole crops. Lange, A. H. Metham applied in sufficient water to incorporate by sprinkler or other means has been effective in controlling weeds, diseases, etc. The objective of this experiment was to determine if activated carbon could be used to deactivate metham in micro-environment of the germinating crop plant. The same crop plant without protection in the seed line was used to establish a base line of phytotoxicity for each rate of metham and each level of water for incorporation into a Delhi loamy sand (organic matter 0.13%, sand 72%, silt 22%, and clay 6%). The metham and other herbicides were applied in the amount of water listed in Table 1 on October 27, 1981. Half of the beds had been wetted with 1/2 inch of water. The seed was planted on October 20. Carbon was incorporated with 100 cc of the seed row and 3 seeds were added to insure seed would be in the carbon treated soil. Plots in replication #1 received "Goldsmith Mercedes" broccoli, replication #2 received "Moran Early March" cauliflower, replication #3 received "Asgrow Gutura" broccoli and replication #4 received "Takii Premium Crop" broccoli seed. The plots were watered daily with 1/8 inch of water beginning October 3 for a total 1/2 inch emerging on November 7, 1981. The plots were rated for stand where 0 = no stand and 10 = solid or best stand with a plant about every inch of seed line. The plots were rated again on November 8 on the same basis but comparing the germination in the carbon treated spots with stand between the treated spots.

Table 1 showed injury from metham at rates above 50 gpa in wet soil surface soil, but more severe injury in dry soil. The addition of pebulate and metolachlor greatly increased the phytotoxicity in both wet and dry soil. The activated carbon reduced the phytotoxicity from both metham and the other 2 preemergence herbicides. The carbon did not eliminate the phytotoxicity, but it did reduce the effects of the metham, pebulate and metolachlor in all treatments.

Table 1. The effect of metham on direct seeded cole crops

Herbicides	Gal or lb/A	Amount of Water	Average1/ Wet Soil	Dry Soil	Average
Metham	50	1/8"	7.5	6.5	7.0
Metham	100	1/8"	5.0	5.5	5.2
Metham	200	1/8"	4.8	4.2	4.5
Metham	50	1/4"	7.2	7.0	7.1
Metham	50	1/2"	5.8	6.2	6.0
Metham+Pebulate	50+4	1/8"	3.8	2.8	3.3
Metham+Pebulate	50+8	1/8"	4.5	4.0	4.2
Metham+Metolachlor	50+2	1/8"	4.5	3.8	4.1
Metham+Metolachlor	50+4	1/8"	3.8	4.2	4.0
Check		1/8"	7.0	9.2	8.1

1/ Average of 4 replications where 0 = no stand and 10 = best stand.

Table 2. The effect of carbon and the amount of metham and water for incorporation in wet and dry soil on germinating cole crops (425-73-506-164-1-81)

Herbicides	Gal or lb/A	Amount of Water (Inches)	Average vigor of cole crops[1/] Wet		Dry	
			Carbon	No Carbon	Carbon	No Carbon
Metham	50	1/8	7.2	5.8	5.2	4.5
Metham	100	1/8	5.0	3.8	5.8	3.0
Metham	200	1/8	6.2	2.2	5.8	1.8
Metham	50	1/4	7.0	4.0	6.5	5.2
Metham	50	1/2	5.8	3.5	6.2	4.5
Metham+Pebulate	50+4	1/8	6.2	1.8	6.2	2.0
Metham+Pebulate .	50+8	1/8	6.8	2.2	5.8	0.8
Metham+Metolachlor	50+2	1/8	6.8	4.0	6.5	3.8
Metham+Metolachlor	50+4	1/8	5.2	3.5	6.2	3.0
Check	-	1/8	7.0	5.2	6.5	9.0

1/ Average of 4 replications where 0 = no vigor or stand and 10 = most vigorous growth.

Table 3. The effect of water incorporated metham on the germination and growth of direct seeded cole crops (425-73-506-164-1-81)

Herbicides	Gal or lb/A	Amount of Water (Inches)	Average Thinning Weights[1/] Wet Soil	Dry Soil
Metham	50	1/8	17.4	21.2
Metham	100	1/8	13.5	13.0
Metham	200	1/8	13.9	8.1
Metham	50	1/4	23.3	17.6
Metham	50	1/2	14.2	20.6
Metham+Pebulate	50+4	1/8	4.8	5.3
Metham+Pebulate	50+8	1/8	3.8	4.5
Metham+Metolachlor	50+2	1/8	9.2	11.7
Metham+Metolachlor	50+4	1/8	9.1	11.7
Check	-	1/8	14.3	20.0

1/ Average of 4 replications with and without carbon protection. Fresh weights from 5 feet of a single row per bed. Seeded October 27 and harvested November 23, 1981.

The comparative effect of four fall applied postemergence herbicides on the regrowth of pears and peaches. Lange, A. H. Four year old Bartlett pear and peach on nemaguard rootstock trees were cut off in the spring of 1980 at 2 feet above ground level and allowed to regrow during the summer. On October 29, 1980, these trees were divided into paired rows of 10 trees of each species. One row of the pair was sprayed on the basal leaves only. The second row was sprayed so that 2/3 of the total foliage from top to bottom was sprayed.

The regrowth was evaluated on April 14, 1981, the next spring, for symptoms on a scale of 0 to 10 where 0 = no effect, 3 = easily observed leaf symptoms and marginal apparent damage, and 10 = complete kill and no regrowth.

The results showed that oxyfluorfen and MSMA had little or no effect on regrowth. Both 2,4-D and glyphosate caused considerable effects on the spring regrowth. Spraying the basal foliage appeared to be as damaging on pears as treating the top foliage. The 2,4-D treatment also appeared to give more injury on pears than on peaches. Glyphosate gave similar effect on both species. It appeared that spraying just the bottom foliage was as bad as spraying more of the upper foliage.

All trees recovered by September 1981. It was almost impossible to find the earlier recorded damage. The treated trees were as large as the untreated ones. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Pear and peach regrowth after being sprayed with four different herbicides in the fall (425-78-502-1-81)

		Average Phytotoxicity 1/			
		Pear		Peach	
Herbicides	lb/A	Base Only	Whole Tree 2/	Base Only	Whole Tree
2,4-D	8	5.6	3.2	0.3	1.3
Oxyfluorfen	8	1.7	1.6	0.0	0.7
MSMA	8	0.7	0.9	3.4	4.3
Glyphosate	8	4.2	4.7	1.9	3.3
Glyphosate	16	4.2	4.7		
Check	-	0.3		0.4	

1/ Average of 10 trees where 0 = no stunting of growth and 10 = no growth.

2/ Indicates part of tree that was sprayed with herbicide. Base includes lower foliage and trunk. Treated October 29, 1980 and evaluated April 14, 1981.

The effect of selected postemergence herbicides on melons and other plant groups. Lange, A. H. Young PMR 45 melons seeded April 13, 1981 were sprayed with 3 new and 2 old herbicides. In order to obtain comparative phytotoxicity data, tomatoes and broccoli seeded the same date were also sprayed May 12, 1981. There was a solid stand of crabgrass present in the plots.

Rated May 25 there were several herbicides that did not produce excess injury. These were chloramben, chlropropham, MBR 22359, MBR 20457, and BAS 9052. None of these were active on established crabgrass but MBR 20457 is excellent postemergence on johnsongrass and nutsedge and should be retested. Those herbicides excessively toxic to melons were oxyfluorfen, acifluorfen and RH 0265. (University of California, Kearney Hort. Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648.)

The effect of postemergence sprays on month old crop plants and crabgrass (425-73-513-175-1-81)

		Averages 1/		
Herbicides	lb/A	Melon Vigor	Tomato Vigor	Crabgrass Control
Chloramben	1	0.0		1.2
Chloramben	2	0.0		0.0
Chlorpropham	1	1.5		1.0
Chlorpropham	2	3.0		1.0
BAS 9052	4	1.2	0.8	5.0
MBR 22359	1/2	1.3	1.0	0.8
MBR 20457	1	2.0	1.0	0.0
MBR 20457	2	3.0	0.7	1.5
MBR 20457	4	3.5	2.0	2.0
Oxyfluorfen	1/16	8.7	10.0	2.8
Oxyfluorfen	1/8	8.7	10.0	4.5
Acifluorfen	1/2	10.0	9.7	5.2
Acifluorfen	1	10.0	10.0	3.8
Acifluorfen	2	10.0	10.0	8.2
RH 0265	1/4	9.0		9.0
RH 0265	1	10.0		4.8
Check	-	0.0	0.5	0.8

1/ Average of 4 replications where 0 = no vigor or stand; no control and 10 = best stand or vigor; best control of weed. Rated May 25, 1981.

Incorporated carbon for protecting the crop in the seed line. Lange, A. H., B. Hoyle, and A. R. Saghir. In order to obtain selective weed control with marginally selective herbicides, or when dealing with weeds closely related to tomatoes, it has been necessary to protect the germinating crop plant from the herbicide. The weed seed which does not have this protection is killed. The objective of this experiment was to evaluate a new in seed line incorporated for mixing in activated carbon.

The beds were prepared and the carbon was incorporated 1 1/2 inches deep and 3 inches wide down the middle of 30 inch beds on November 19, 1980. "Great Lakes" lettuce was seeded down the treated seed row. The continuous band was 3 inches wide and the intermittent carbon spots were 3 inches in diameter and 1 foot apart down the seed row. The herbicides were applied over the bed tops (about 20 inches wide) on November 20, 1980.

The lettuce stand and vigor were evaluated, and then plants removed on May 7, 1981. The lower rates of chlorpropham 124 were reapplied, but the high rates of chlorpropham and metribuzin were not. Prior to retreatment the seed lines were reseeded this time with processing tomatoes (UC 82 variety).

The protection of the lettuce stand from chlropropham injury with continuous and intermittent carbon was striking at the 2 lb/A rate. Protection against metribuzin was not adequate, possibly due to leaching of the herbicide below the protection layer. The weed control was season long and excellent.

The retreatment with chlorpropham was necessary for continued weed control, but also to evaluate the activity of the fall-applied carbon in the soil. The metribuzin was not reused because of the residual weed control into May 1981, and the possibility of excessive injury to tomatoes. The original carbon remained in the soil from November 1980 and protected the tomato seed row from the second application of chlorpropham when seed was planted 6 months later in May 1981. The residual activity of metribuzin appeared to be slightly reduced at the high rate of carbon. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, California 93648.)

Table 1. Vigor of Iceberg Head Lettuce

Herbicides	lb/A	lb/A Carbon	Average Vigor[1/] Carbon Intermittent	Carbon Continuous
Chlorpropham 124	2	0	4.0	2.2
Chlorpropham 124	2	100	7.0	6.5
Chlorpropham 124	2	400	7.2	8.2
Chlorpropham 124	4	0	2.5	0.5
Chlorpropham 124	4	100	2.2	5.0
Chlorpropham 124	4	400	5.5	6.5
Chlorpropham 124	8	0	0.0	0.8
Chlorpropham 124	8	100	1.5	4.5
Chlorpropham 124 ·	8	400	4.5	2.5
Chlorpropham 124+Metribuzin	4+1	0	0.0	0.0
Chlorpropham 124+Metribuzin	4+1	100	0.0	0.0
Chlorpropham 124+Metribuzin	4+1	400	0.0	0.0
Check	-	400	7.0	7.8
Check	-	0	8.5	7.2

1/ Average of 4 replications where 0 = no vigor and 10 = most vigorous growth. Treated November 20, 1980 and evaluated February 27, 1981.

Table 2. Evaluation of varying rates of carbon on the control of London rocket and lambsquarters in a processing tomato trial (425-78-513-186-4-81)

Herbicides	lb/A	lb/A Carbon	London Rocket and Lambsquarters Control[1/] Carbon Intermittent	Carbon Continuous
Chlorpropham 124	2	0	9.2	8.0
Chlorpropham 124	2	100	9.0	7.5
Chlorpropham 124	2	400	6.0	6.8
Chlorpropham 124	4	0	8.8	9.5
Chlorpropham 124	4	100	8.7	8.0
Chlorpropham 124	4	400	7.5	8.8
Chlorpropham 124	8	0	10.0	10.0
Chlorpropham 124	8	100	10.0	9.8
Chlorpropham 124	8	400	7.3	7.1
Chlorpropham 124+Metribuzin	4+1	0	10.0	10.0
Chlorpropham 124+Metribuzin	4+1	100	10.0	10.0
Chlorpropham 124+Metribuzin	4+1	400	10.0	10.0
Check	-	400	2.3	3.8
Check	-	0	2.3	1.5

1/ Average of 6 replications where 0 = no control and 10 = best weed control. Treated November 20, 1980 and evaluated April 10, 1981.

Table 3. Evaluation of tomato vigor and stand planted in varying rates of carbon (425-78-513-186-4-81)

Herbicides[2]	lb/A	Carbon	Average Tomato Stand and Vigor[1] Carbon Intermittent	Carbon Continuous
Chlorpropham 124[3]	2	0	3.8	5.2
Chlorpropham 124[3]	2	100	3.5	5.2
Chlorpropham 124[3]	2	400	7.3	7.8
Chlorpropham 124[3]	4	0	5.0	6.0
Chlorpropham 124[3]	4	100	5.3	4.2
Chlorpropham 124[3]	4	400	4.5	7.0
Chlorpropham 124	8	0	7.7	7.8
Chlorpropham 124	8	100	8.2	6.2
Chlorpropham 124	8	400	7.5	7.5
Chlorpropham 124+Metribuzin	4+1	0	2.0	4.7
Chlorpropham 124+Metribuzin	4+1	100	1.0	4.2
Chlorpropham 124+Metribuzin	4+1	400	4.8	5.7
Check	-	400	9.2	9.5
Check	-	0	9.2	7.7

1/ Average of 6 replications where 0 = no stand or vigor, plant dead and 10 = best stand, most vigorous growth.

2/ All herbicides treated November 20, 1980. Crop seeded May 6, 1981. Evaluated June 4, 1981.

3/ These herbicides were retreated May 7, 1981.

The effect of continuous use of preemergence herbicides in young pistachios. Lange, A. H. and L. J. Nygren. Young newly planted pistachio trees in a Hanford fine sandy loam soil were sprayed annually for five years. The trees were sprayed December 16, 1979, December 12, 1977, December 29, 1978, December 28, 1979 and March 6, 1981.

At the end of the growing season the plots were evaluated for weed control and phytotoxicity. The main weeds at harvest were a mixture of crabgrass, barnyardgrass and lovegrass. Some plots showed a build-up of bermudagrass, but the stand was absent where poor grass control was obtained, therefore, there was no bermudagrass in the untreated check. By far the poorest bermudagrass control was in the simazine plots where other weeds were controlled. The excessive rate of oryzalin appeared to give considerable bermudagrass control as did norflurazon and fluridone where other weeds were also controlled. There was no apparent phytotoxicity from any treatments in 1981. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, California 93648.)

The effect of 5 years of use of herbicides in pistachios on weed control (425-73-501-100-1-77)

		Average[1/]			
Herbicides	lb/A	Flaxleaved fleabane & Marestail	Crab-, Love-, Barnyard-grass	Bermuda grass	Phyto
Napropamide	4	4.2	2.2	6.7	0.0
Oryzalin	4	9.7	6.2	6.3	0.0
Oryzalin	16	8.0	9.7	8.3	0.0
Oxyfluorfen	2	8.0	1.2	8.3	0.0
Oxyfluorfen	4	8.0	3.3	5.0	0.0
Norflurazon	2	5.3	8.7	10.0	0.0
Norflurazon	4	7.8	8.5	7.0	0.0
Fluridone	1	8.3	8.2	9.3	0.0
Fluridone	2	9.5	9.2	8.3	0.0
Simazine	1	8.3	2.8	3.3	0.0
Simazine	2	10.0	5.8	2.3	0.0
Check	-	1.7	0.0	10.0	0.0

1/ Average of 6 replications where 0 = no effect and 10 = best control. Latest retreatment March 6, 1981. Evaluated September 20, 1981.

The effect of the amount of water carrier on the injection of metham in the irrigation water in a Delhi loamy sand soil. Lange, A. H. and L. J. Nygren. Thirty inch beds were prepared in a Delhi loamy sand soil (88% sand, 10% silt, 2% clay, 0.3% organic matter). Metham was diluted into the equivalent of 1/4 or 1 inch of water and applied January 8, 1981 over the seed line of previously planted tomato seed using a plastic sprinkling can. Half of the plots were covered with black paper-plastic sheets and half were left exposed. The rainfall during this period was 4.7 inches.

The results clearly indicated that metham diluted in 1/4 inch of water was more active in this soil than when diluted in 1 inch of water. The kill of nightshade was obtained with only 12 1/2 gallons per acre on a broadcast basis where no mulch was used. The poor control with mulch may have been due to cooler temperatures under the plastic mulch. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, California 93648.)

The effect of amount of irrigation into which metham was applied over a short period of time with and without a plastic mulch covering (425-73-513-186-5-81)

		Average[1/]			
		No Mulch		With Mulch	
		Amount of Water		Amount of Water	
Herbicide	gpa	1/4"	1"	1/4"	1"
Metham	12½	9.0	5.8	3.5	3.8
Metham	25	10.0	4.8	6.5	4.8
Metham	50	9.8	6.0	9.7	5.8
Metham	100	10.0	8.5	9.2	7.0
Check	-	4.2	1.2	2.0	1.2
Average of Metham		9.7	6.3	7.2	5.4

1/ Average of 4 replications where 0 = no effect and 10 = complete kill. Treated January 8 and evaluated March 12, 1981.

Acifluorfen for the control of black nightshade in processing tomatoes. Lange, A. H., P. Osterli, and L. Nygren. A very lightly infested planting of young 4 inch tomatoes were sprayed with 2 formulations of acifluorfen on May 28, 1981. Two gallonages were used of a single concentration of each, i.e., 50 and 100 gpa. Both hairy and black nightshades were present in small numbers. The plots were rated on June 4 and 7, 1981 and the grower then weeded the plots. The plots were harvested September 8 by cutting and weighing the entire plant and fruit for each plot.

The results indicate excellent control of black nightshade but the weed population was low. Control of hairy nightshade was considerably less than black nightshade. The injury to the tomatoes for both formulations was greater at the higher gallonage possibly due to the warmer temperatures. There was no detrimental effects on yield from the early phytotoxicity symptoms. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, CA 93648.)

			Average 1/						
			Black Nightshade Control		Hairy Nightshade Control		Tomato Phyto		Yield Kg/plot
Herbicides	lb/A	Gal/A	6/4	6/7	6/4	6/7	6/4	6/7	9/8
Acifluorfen (T)	1/4	50	9.0	10.0	3.5	7.7	2.3	1.7	21.7
Acifluorfen	1/2	100	8.3	10.0	4.0	8.7	3.7	4.0	18.8
Acifluorfen (B)	1/4	50	8.5	10.0	3.7	4.7	2.0	1.3	22.2
Acifluorfen	1/2	100	10.0	10.0	7.0	8.3	4.0	3.3	23.6
Check		-	0.0	5.0	0.0	2.3	0.0	0.7	20.1

1/ Average of 4 replications where 0 = no weed control or no phytotoxicity symptoms and 10 = complete control of weeds or plants dead. Treated May 28, and evaluated June 4 and 7, 1981.

2/ T indicates Tackle formulation of acifluorfen and B indicates Blazer formulation of acifluorfen.

Black nightshade control with postemergence herbicides. Lange, A. H., L, Nygren, and P. P. Osterli. Young processing tomatoes in the 2 to 4 leaf stage were sprayed May 28, 1981 with several herbicides and combinations in 50 gallons per acre of carrier (water). The heavy infestation of black nightshade was also in the 2 to 4 leaf stage. Some barnyardgrass and pigweed were also present. Half of the replications were irrigated on the day of spraying. The other half were irrigated one day later. Temperatures were in the 90F range during the afternoons after spray irrigation. Nightshade control, tomato phytotoxicity and vigor ratings were made on June 4, June 10 and July 15, 1981. Yields were taken from the acifluorfen plots on September 8 by weighing the entire cut-off plant and fruit for each plot.

Increasing rates of acifluorfen caused slight increases in injury symptoms particularly at the high rate of the Blazer (B) formulation. However, there was no apparent decrease in yield at harvest time. There was probably no decrease in yield from the untreated check, although there appeared to be a trend with the Tackle (T) formulation. The late application of this experiment suggested lowering the rate as the weather warms up in the spring. Combining BAS 9052 and oil was obviously a mistake as seen in another experiment. Because of increasing the activity of acifluorfen with soil this combination would have to be done sequentially instead of as a tank mix. Even oxyfluorfen showed some degree of selectivity but not as good as acifluorfen. (University of California, Kearney Hort. Field Station, 9240 S. Riverbend Avenue, Parlier, CA 93648.)

The effect of postemergence sprays
on the control of black nightshade in tomatoes
(425-50-513-186-8-81)

Herbicides	lb/A	Averages[1/] Black Nightshade Control	Tomato Phyto 1 Week	Tomato Vigor 2 weeks	Tomato Vigor 6 weeks	Yield Kg/plot
Acifluorfen (T)	1/8	7.8	1.0	9.2	9.5	32.5
Acifluorfen	1/4	9.2	2.0	8.5	10.0	27.8
Acifluorfen	1/2	10.0	3.5	7.2	8.0	26.4
Acifluorfen (B)	1/4	9.0	1.8	8.8	10.0	33.3
Acifluorfen	1/2	10.0	5.7	6.0	7.3	32.3
Acifluorfen+Oil	1/2+1/8	10.0	7.5	3.8	5.5	-
Acifluorfen+Oil	1+1/4	10.0	9.2	1.0	1.8	-
Oxyfluorfen	1/16	6.5	3.5	7.8	9.8	-
Oxyfluorfen	1/8	9.0	5.2	5.5	7.8	-
Check	-	0.0	0.0	9.0	7.8	32.3

1/ Average of 4 replications where 0 = no control or no phyto symptoms and 10 = no weeds or most vigorous crop growth. Applied May 28, 1981. Evaluated June 4 and July 10, 1981. Harvested September 8, 1981.

Response of dodder and 3 tomato cultivars to sequential applications of glyphosate. Lange, A. H. and A. R. Saghir. Glyphosate was applied sequentially on the foliage of 3 tomato cultivars after dodder was attached and growing vigorously on them in the greenhouse. Five rates were used ranging between 0.025 to 0.150 Kg/ha applied in water at 860 L/ha, with the second application sprayed one week after the initial one. Three tomato cultivars were tested namely "E 6203", "NCX 3032", and Murietta". The responses of dodder and tomato were evaluated visually, and phytotoxicity symptoms were noted. Dodder regrowth and percent tomato kill were determined one week after removing dodder shoots from the host.

The results show that sequential applications of glyphosate at 0.05+0.05 Kg/ha and above gave selective dodder control; however, phytotoxicity started to appear on the tomato cultivar "Murietta" at 0.075+0.075 Kg/ha and above and "E·6203" at rates above 0.1+0.1 Kg/ha. Leaf chlorosis occurred 3 days after treatment at these high rates. The cultivar "NCX 3032" was more tolerant to glyphosate treatment. (University of California, Kearney Hort. Field Station, 9240 South Riverbend Avenue, Parlier, CA 93648.)

Effect of sequential treatment of glyphosate
on dodder and tomato cultivars in greenhouse
(425-73-514-186-3-81)

Treatment (Kg/ha)	E 6203 Dodder Control[a/]	E 6203 Tomato Vigor [b/]	NCX 3032 Dodder Control	NCX 3032 Tomato Vigor
0.025+0.025	3.7	8.7	5.3	8.0
0.050+0.050	7.7	7.0	7.7	8.5
0.100+0.100	6.7	4.7	8.0	7.0
0.150+0.150	7.7	2.0	7.7	6.3
Untreated	2.0	7.7	4.3	6.0

a/ 0 = no effect; 10 = good control (3 weeks after treatment).
b/ 0 = dead plants; 10 = vigorous plants (3 weeks after treatment).

Pre-plant applications of RE-28236, UBI S734 and metribuzin on potatoes. LEINO, P. W. and R. H. Callihan. Tolerance of potatoes, annual grass and broad-leaved weed control were evaluated after RE-28236, UBI S734 and metribuzin were applied to potatoes at the Aberdeen Research & Extension Center, Idaho.

On May 1, 1981 RE-28236, UBI S734, metribuzin and RE-28236 plus metribuzin were applied to a plowed field and immediately incorporated by cultivating with a disc twice. Temperatures were 30.5 for air, 32.2 C for soil surface, and 23.3 C for the soil at 15 cm depth. The soil surface was dry with 60% available soil moisture (ASM) at a depth of 15 cm. Application was made with a tractor-mounted sprayer equipped with a 3.7 m boom (8005 nozzles) calibrated to deliver 327 L/ha (35 gpa). On May 5, 1981, potatoes were planted. A randomized complete block design with four replicates was used.

Before the hilling operation which destroys most of the growing weeds, a weed assessment was made on June 9, 1981. Good control of green foxtail was exhibited in all treated plots with 24 to 96 plants/m^2 compared to the check with 720 plants/m^2. All metribuzin treatments provided excellent control of the lambsquarters and redroot pigweed.

After hilling, no more tillage was done before the July 29, 1981 assessment. Metribuzin, RE-28236, and the RE-28236 plus metribuzin treatments failed to provide adequate control of green foxtail. However UBI S734 did provide 100% control of green foxtail at the 2.2 Kg/ha rate. Lambsquarters were controlled by metribuzin but control of redroot pigweed proved to be inadequate by the second assessment. Hairy nightshade was not satisfactorily controlled by any of the treatments.

At the second assessment after hilling, RE-28236 showed 14% injury to potatoes and RE-28236 plus metribuzin gave 24% injury. Metribuzin alone and UBI S734 were not significantly different than the check in the injury rating. No treatment exhibited any noticeable injury at the time of the first assessment. (Research & Extension Center, University of Idaho, Aberdeen, ID 83210).

Weed density and potato injury evaluations made following pre-plant applications of RE-28236, UBI S734 and metribuzin on potatoes

	Treatment	Rate Kg/ha	Green Foxtail[1/] 6-9[2/]	Green Foxtail[1/] 7-29[3/]	Lambsquarters[1/] 6-9	Lambsquarters[1/] 7-29	Redroot Pigweed[1/] 6-9	Redroot Pigweed[1/] 7-29	Hairy Nightshade[1/] 7-29	% Injury To Potatoes 7-7[4/]
1.	Check		720	58	75	23	370	113	44	0
2.	Metribuzin	0.6	39	71	1	2	4	68	60	1
3.	RE-28236 3E	3.4	96	74	19	13	196	103	39	14
4.	RE-28236+Metribuzin	3.4+0.6	26	52	6	3	3	82	53	24
5.	UBI S734-75wp	1.1	61	1	51	10	221	99	57	3
6.	UBI S734-75wp	2.2	24	0	54	29	39	61	56	2
	LSD 5%		92.4	55.3	36.3	28.9	119.9	49.8	40.1	7.8
	C.V.		38.1	86.0	70.3	145.4	57.4	37.8	51.8	70.8

1/ Means of four replicates measured in weeds/m^2

2/ Assessment made June 9, 1981 prior to hilling

3/ Assessment made July 29, 1981 after hilling

4/ Assessment made July 7, 1981 after hilling

Weed control in potatoes with registered herbicide combinations of metribuzin. LEINO, P. W. and R. H. Callihan. Metribuzin, with and without recommended herbicides, was evaluated at two locations for control of annual weeds in 'Russet Burbank' potatoes in Eastern Idaho.

Pre-emergent treatments were applied at Aberdeen Research & Extension Center on June 8, 1981 to a dry surfaced, Declo loam (≈1.6% OM) and on June 10, 1981 at the Shelley location to a dry-surfaced Bannock loam. The Aberdeen plots were sprinkled with 1.3 to 2 cm of irrigation water immediately following the treatments and the Shelley plot of metribuzin-EPTC was hand incorporated with rakes immediately after application and irrigated with about 2 cm of water the next day. The post-emergent treatments at the Aberdeen location were made on July 9, 1981 and at the Shelley location on July 10, 1981. Potatoes were planted in Aberdeen on May 6, 1981 and in Shelley on May 18, 1981. All applications were made with a 3.7 m boom (8005 nozzles) calibrated to 327 L/ha (35 gpa). In both locations a randomized complete block design with four replications was used.

All herbicide treatments gave significant control of green foxtail compared with the untreated check. Metribuzin alone gave less control of this weed than other herbicide treatments. Metribuzin plus RO-138895 and BAS 9052 OH plus metribuzin, both applied post-emergent, also had higher green foxtail counts. This limited control may have been due to the shielding of the potato canopy at the time of spraying. However in both locations the RO-138895 plus metribuzin treatment performed better than BAS 9052 OH plus metribuzin suggesting RO-138895 has some soil activity.

Hairy nightshade, a member of the potato family, is tolerant of metribuzin. Therefore when metribuzin reduces competition of other weeds, it encourages hairy nightshade growth. On September 9, 1981 hairy nightshade was assessed using the plots treated with metribuzin alone as the check. Alachlor plus metribuzin was the most effective treatment with 75% control followed by the methlachlor plus metribuzin treatment providing 40% control. Metribuzin plus EPTC and pendimethalin plus metribuzin provided 23 and 20% control, respectively.

All pre-emergent applied treatments were effective in both locations in controlling redroot pigweed, lambsquarters, and kochia. With the two post-emergent treatments, the metribuzin plus RO-138895 treatment was ineffective in controlling redroot pigweed and the metribuzin plus BAS 9052 OH treatment was ineffective in controlling kochia at the Aberdeen location. This lack of effectiveness may have been due to the large size of kochia and pigweed and the protection by the potato canopy of these plants at the time of application.

Yield of U.S. No. 1 potatoes and total yield were greater in herbicide-treated plots than in the check at both locations. The methlachlor plus metribuzin gave the best yield in both locations. (Research & Extension Center, University of Idaho, Aberdeen, ID 83210).

Table 1. Weed control and potato yields at Aberdeen, Idaho location

Treatment	Rate Kg/ha	Green Foxtail[1] 6-30	Green Foxtail[1] 7-24	Redroot Pigweed[1] 6-30	Redroot Pigweed[1] 7-24	Lambs-quarters[1] 6-30	Lambs-quarters[1] 7-24	Kochia[1] 6-30	Kochia[1] 7-24	Hairy Nightshade[1/2] 7-24	Hairy Nightshade[1/2] 9-21	Potato Yield Kg/plot[3] Weight US #1	Potato Yield Kg/plot[3] Total Yield
1. Check	0	679	662	86	45	82	84	23	17	7	-	10.7	21.0
2. Metribuzin	0.6	86	60	0	3	0	1	0	0	18	-	30.4	48.3
3. Metribuzin + EPTC	0.6	18	32	0	1	0	0	0	0	3	23	34.8	55.2
4. Metribuzin +Pendimethalin	0.6 0.8	4	6	0	0	0	0	0	0	7	20	32.4	51.4
5. Metribuzin +Metolachlor	0.6 1.4	0	12	0	2	0	0	1	1	3	40	35.9	56.5
6. Metribuzin +Alachlor	0.6 2.2	5	22	0	1	0	0	0	0	1	74	28.1	40.5
7. Metribuzin[4] +RO-138895	0.6 0.6	-	42	-	32	-	0	-	6	8	9	22.3	38.1
8. Metribuzin[4] +BAS 9052 OH	0.6 0.6	-	209	-	8	-	18	-	12	11	1	22.8	40.2
LSD 5%		157.9	228.6	41.2	24.0	33.6	32.6	6.7	9.6	5.9	26.6	6.9	
C.V.		79.5	119.2	190.2	140.9	161.9	172.9	116.8	151.8	55.4	63.7	7.8	

1/ Means of four replicates measured in weeds/m^2

2/ September 21, 1981 hairy nightshade used the plots treated with metribuzin alone as a check. These data are expressed in percent of metribuzin control

3/ Plot size equals 3.7 m by 12.2 m (12 ft. by 40 ft.)

4/ Post-emergent applied treatments

Table 2. Weed control and potato yields at Shelley, Idaho location

Treatment	Rate Kg/ha	Green Foxtail[1/] 7-8	Green Foxtail[1/] 7-24	Redroot Pigweed[1/] 7-8	Redroot Pigweed[1/] 7-24	Lambs-quarters[1/] 7-8	Lambs-quarters[1/] 7-24	Kochia[1/] 7-8	Kochia[1/] 7-24	Potato Yield Kg/plot[2/] Weight US #1	Potato Yield Kg/plot[2/] Total Yield
1. Check	0	1096	981	63	31	33	44	24	6	13.2	31.0
2. Metribuzin	0.6	249	68	0	0	0	0	0	0	35.0	56.8
3. Metribuzin + EPTC	0.6	38	25	0	0	0	0	0	0	33.6	53.8
4. Metribuzin +Pendimethalin	0.6 0.8	14	5	0	0	0	0	0	0	35.4	61.5
5. Metribuzin +Metolachlor	0.6 1.4	12	7	0	0	0	0	0	0	37.7	63.3
6. Metribuzin +Alachlor	0.6 2.2	6	5	0	0	0	0	0	0	34.0	57.2
7. Metribuzin[3/] +RO-138895	0.6 0.6	-	8	-	3	-	1	-	2	35.0	60.4
8. Metribuzin[3/] +BAS 9052 OH	0.6 0.6	-	124	-	6	-	1	-	2	35.4	59.9
LSD 5%		118.3	78.6	14.5	4.7	3.7	4.3	6.9	2.0	8.7	
C.V.		33.3	35.0	92.3	65.2	44.2	52.8	116.8	116.6	8.3	

1/ Means of four replicates measured in weeds/m^2

2/ Plot size 3.7 m by 12.2 m (12 ft. by 40 ft.)

3/ Post-emergent applied treatments

Russet Burbank potato russeting from mefluidide. LEINO, P. W., R. H. Callihan, and L. C. Haderlie. A late season application of mefluidide was made to potatoes to determine the effect on the coloring and russeting.

Mefluidide was applied at 500, 1000, 2000, and 4000 ppm on September 17, 1981 to a dry-surfaced Declo loam soil to late-planted (June 12, 1981) potatoes. These potatoes were harvested eleven days later on September 28, 1981 without any vine kill measures and placed into potato storage. On November 17, a preliminary rating of the color/russeting was made.

Generally there was an increase in darkness of the color and an increased russeting as the dosage increased. Application of 500 ppm had a "marketable" color/russeting rating, 1000 ppm was marginal in color/russeting, and above 1000 ppm was undesirable in market color / russeting.

The darkening of the tuber and the increase in russeting symptoms appeared at the apical end of the tuber. The 2000 and 4000 ppm rates showed signs of water loss with their excessive russeting of the skin. The apical areas in the untreated plots were skinned which suggested immature skins. However, all mefluidide-treated potatoes did not exhibit this skinning which suggests mefluidide treatments promote maturation of potato periderm.

Color/russeting rating after 7 weeks of storage

Mefluidide (ppm)	Rating[1/]
1. 0	1
2. 500	2
3. 1000	4
4. 2000	7
5. 4000	8
LSD 5%	1.8
C.V.	26.7

[1/] Rating 1 = untreated (light color)
10 = darkest brown color noted in preview of potatoes

Sugar beet weed control and yields by recommended herbicides in Idaho. LEINO, P. W. and R. H. Callihan. Registered herbicides and herbicide combinations were evaluated for annual weed control in sugar beets at the Aberdeen Research & Extension Center.

Pre-emerged herbicides were applied on a dry-surfaced Declo loam (≈1.6% OM) on April 17, 1981 to pre-emergent 'AH-14' variety sugar beets. Treatments were incorporated with 1.3 to 2 cm water by sprinkler irrigation within 1 hr of spraying. Three post-emergent treatments were applied on May 28, 1981 at the 5- to 6-leaf-growth-stage on a dry soil surface with an air temperature of 22 C. All treatments were applied with a tractor-mounted sprayer equipped with 8005 nozzles calibrated to deliver 327 L/ha (35 gpa). A randomized complete block design with four replications was used. Weed seeds were spread before planting beets to ensure a heavy weed infestation.

Ethofumesate alone and in combination with other sugar beet herbicides provided 90% or greater weed control for most species but stunted the beets with a reduction of 55 to 65% in biomass. However, this beet stunting did not affect beet yield since the ethofumesate-treated plots exhibited the highest yield. Ethofumesate pre-emergent followed by phenmedipham plus desmedipham post-emergent was the best overall treatment with all weeds 100% controlled and with the best beet yield of any treatment. Pre-emergent applied diethatyl-ethyl alone controlled 95% of the green foxtail and 91% of redroot pigweed. Cycloate alone gave less than 50% control of redroot pigweed, tansy mustard, and kochia (23%) but 87% or better control of lambsquarters, wheat, and green foxtail.

Like cycloate, kochia and redroot pigweed control by pyrazon was less than 50%. However, the other four weeds were more than 91% controlled with pyrazon.

. The post-emergent applied phenmedipham plus desmedipham combination provided poor overall control but application was not made until the 5- to 6-leaf-growth-stage due to weather conditions. (Research & Extension Center, University of Idaho, Aberdeen, ID 83210).

Percent biomass and weeds/m for early weed assessment on May 29, 1981

Treatment	Rate Kg/ha	Lambs-quarters	Redroot Pigweed	Tansy Mustard	Wheat	Green Foxtail	% Biomass
1. Check	0	23	65	16	20	467	100
2. Ethofumesate	3.4	0	0	1	0	1	44
3. Diethatyl ethyl	4.5	1	3	1	8	10	80
4. Cycloate	4.5	4	2	0	4	9	75
5. Pyrazon	4.1	1	1	0	3	16	83
6. Ethofumesate + pyrazon	2.3+ 1.7	0	0	0	0	0	45
7. Ethofumesate + diethatyl ethyl	1.7+ 2.3	0	0	1	0	1	39
8. Ethofumesate + cycloate	1.7+ 1.7	0	0	1	0	1	36
9. Ethofumesate[1/] +phenmedipham +desmedipham	3.4 0.7+ 0.7	0	0	1	0	1	45
LSD 5%		7.9	6.7	4.6	5.3	22.0	14.3
C.V.		168.7	58.9	148.0	94.0	26.9	16.1

[1/] Ethofumesate application was followed by a phenmedipham plus desmedipham application on May 28, 1981.

Late weed assessment on September 14, 1981 and final yield data

Treatment	Kg/ha	Lambs-quarters %C[1/]	Lambs-quarters VR[2/]	Redroot Pigweed %C	Redroot Pigweed VR	Tansy Mustard %C	Tansy Mustard VR	Wheat %C	Wheat VR	Green Foxtail %C	Green Foxtail VR	Kochia %C	Kochia VR	Yield (Kg)	No.[5/]
1. Check	0		0		0		0		0		0		0	15.6	18
2. Ethofumesate	3.4	95	53	100	100	92	31	100	100	99	39	100	64	148.0	61
3. Diethatyl ethyl	4.5	36	11	91	25	73	25	62	23	95	5	6	4	52.2	37
4. Cycloate	4.5	87	24	46	0	46	15	90	32	97	0	23	0	89.7	53
5. Pyrazon	4.1	100	95	53	8	94	70	99	80	91	3	24	1	127.8	57
6. Ethofumesate +pyrazon	2.3+ 1.7	99	46	100	100	92	93	100	100	99	50	90	13	139.0	57
7. Ethofumesate +diethatyl ethyl	1.7+ 2.3	95	45	95	50	85	16	100	88	99	53	96	10	140.2	55
8. Ethofumesate +cycloate	1.7+ 1.7	94	51	100	100	73	15	99	91	99	29	90	3	143.5	58
9. Ethofumesate[3/] phenmedipham +desmedipham	3.4+ 0.7+ 0.7	100	90	100	100	100	100	100	100	100	75	100	69	163.7	61
10. Phenmedipham[4/] +desmedipham	0.3+ 0.3	92	49	58	21	43	14	45	54	37	3	58	35	107.6	60
11. Phenmedipham[4/] +desmedipham	0.7+ 0.7	86	49	44	8	26	18	21	19	38	0	64	28	56.1	45
12. Phenmedipham[4/] +desmedipham +ethofumesate	0.7+ 0.7 3.4	100	96	100	100	75	58	89	66	57	0	90	30	148.0	66
LSD 5%		13.3	27.1	29.3	34.6	31.8	33.0	15.6	18.3	15.7	44.1	25.4	29.5	30.9	15.7
C.V.		10.3	37.1	25.2	47.3	30.4	60.6	13.1	20.3	13.1	144.1	26.2	96.5	21.6	20.9

1/ %C=Percent control

2/ VR=Vigor reduction

3/ Ethofumesate applied pre-emergent (as with previous treatments), phenmedipham + desmedipham applied post-emergent

4/ Application made post-emergent 5/ Yield & No. are from 18.3 m of harvested row

The effects of phosphate buffer and Amway adjuvant on SN 503 and phenmedipham plus desmedipham in sugar beets. LEINO, P. W., S. W. Gawronski, and R. H. Callihan. Sugar beets treated with phenmedipham plus desmedipham, with and without Amway adjuvant, SN 503 and phenmedipham plus desmedipham and phosphate buffered and unbuffered SN 503, were evaluated for weed control and crop tolerance in two experiments at the Aberdeen Research & Extension Center, Idaho.

On May 28, 1981 application of phenmedipham plus desmedipham, with and without Amway adjuvant, was made to sugar beets in the 5- to 6-leaf-stage growing in a Declo loam soil. Since weather conditions prevented application of the treatments at the optimum time, a second experiment was planted on July 27, 1981. Application of herbicides was made to the late-planted sugar beets when they reached the four-true-leaf-stage (August 19, 1981). Phenmedipham plus desmedipham, with and without Amway adjuvant, was one series of treat ments. In a second series of treatments, SN 503 (a mixture of phenmedipham plus desmedipham) was applied at two rates and compared to rates of phenmedipham plus desmedipham. A third series of treatments of this late-planted experiment was to mix SN 503 and phenmedipham plus desmedipham with pH8 water 24 hr before application and compare these treatments to SN 503 which was mixed in a phosphate buffered solution at the same time. Treatments in both fields were made with a 3.4 m boom (8005 nozzles) calibrated to deliver 327 L/ha (35 gpa). A randomized complete block design with four replicates was used in each case.

Overall weed control on the sugar beets sprayed at the 5- to 6-leaf stage was poor; lambsquarters was the only weed showing significant control (Table 1). Phenmedipham plus desmedipham at the 0.4+0.4 Kg/ha rate showed 6% injury to sugar beets, and when Amway adjuvant was added, the injury rose to 17%. Treatments made to the late-planted sugar beets were made at an earlier growth stage (four-true-leaf) but were also made later in the season at a higher mean air temperature. These higher temperatures enhanced beet injury significantly in all treatments as would be expected with these compounds (Table 2). Phenmedipham plus desmedipham at the 0.8+0.8 Kg/ha rate showed 15% injury and when Amway adjuvant was added, the injury rose to 20%. At the 1.1+1.1 Kg/ha rate of phenmedipham plus desmedipham, the injury was 26% and Amway adjuvant addition increased the injury to 35%. SN 503 at the 0.8 Kg/ha rate had 14% injury and at the 1.1 Kg/ha rate had 35% injury. SN 503 mixed 24 hr before application in pH 8 water showed 23% injury and when this solution was buffered with a phosphate buffer, the injury rose to 33%.

In the late planted experiment (Table 2)-, control of green foxtail and lambsquarters was significantly greater and vigor significantly reduced in all treatments. Higher rates attained greater weed control with more vigor reduction. All treatments controlled lambsquarters at a rate greater than 92%, while green foxtail was controlled at a rate 73% or more. Addition of Amway adjuvant did not significantly increase weed control or vigor reduction. SN 503 mixed in water at pH8 24 hr before application was not significantly different in activity than SN 503 which was mixed at the same time in phosphate buffering solution (pH7). (Research & Extension Center, University of Idaho, Aberdeen, Idaho 83210).

Table 1. Percent injury and weed control with phenmedipham plus desmedipham with and without Amway adjuvant[1/]

Treatment	Rate Kg/ha	% Injury	Green[2/] Foxtail	Kochia[2/]	Lambs[2/] quarters	Redroot[2/] Pigweed	Tansy[2/] Mustard
1. Check		0	172	2	11	18	13
2. Phenmedipham	0.4	6	124	3	3	16	13
+desmedipham	0.4						
3. Phenmedipham	0.4	17	128	3	7	18	16
+desmedipham	0.4						
+Amway adjuvant							
LSD 5%		12.1	63.1	1.9	5.2	10.4	9.5
C.V.		85.5	30.4	54.9	55.4	40.4	44.1

[1/]Assessment made on June 17, 1981
[2/]Means of four replicates measured in weeds/m^2
[3/]1.2 L/ha (1 pt/A Amway adjuvant)

Table 2. Percent sugar beet injury, weed stand reduction and weed vigor reduction with N 503, phenmedipham plus desmedipham

Treatment	Rate	% Injury to Sugar beets	Green Foxtail		Lambs-quarters	
	Kg/ha	8-26-81	SR[1/]	VR[2/]	SR	VR
1. Check		0	0	0	0	0
2. Phenmedipham	0.8+0.8	15	75	65	93	85
+desmedipham						
3. Phenmedipham	1.1+1.1	26	78	65	98	75
+desmedipham						
4. SN 503	0.8	14	81	81	96	85
5. SN 503	1.1	35	90	90	97	85
6. SN 503[3/]	0.8	23	86	70	94	79
7. SN 503[3/4/]	0.8	33	75	65	96	83
8. Phenmedipham[5/]	0.8+0.8	20	73	66	94	81
+desmedipham						
9. Phenmedipham[5/]	1.1+1.1	35	84	74	98	88
+desmedipham						
10. Phenmedipham	0.8+0.8	26	84	81	98	94
+desmedipham						
LSD 5%		10.9	15.9	18.7	5.8	16.4
C.V.		33.2	15.1	19.7	4.7	15.0

[1/]SR = stand reduction on September 14, 1981 expressed as percent of check
[2/]VR = vigor reduction on September 14, 1981 expressed as percent of check
[3/]Mixed 24 hr before application
[4/]2 gal phosphate buffer solution
[5/]Plus 1.2 L/ha (1 pt/A) Amway adjuvant

An evaluation of 6 preplant incorporated herbicides and combinations on fall/winter preformed fallow tomato beds. Mullen R. J., C. L. Elmore, and A. H. Lange. A weed control trial in tomatoes comparing 6 winter/spring herbicides and combinations was established near Stockton, California, on December 23, 1980. In the trial, preformed tomato beds were surface treated, utilizing a CO_2 hand-held backpack sprayer, and the treatments were rainfall incorporated. Unfortunately, measureable rainfall did not fall on the trial area until January 19, 1981 thus resulting in erratic performance of some of the herbicides tested. The soil was a Stockton adobe clay and had small clods. Tomato was planted on April 27, 1981. A weed control rating was made on March 31 and a crop vigor rating was taken on May 29. Weeds present were miners lettuce, yellow nutsedge, hairy and black nightshade, shepherds purse, and volunteer cereal. Overall, metribuzin by itself or in combination with chlorpropham or pendimethalin gave the best weed control on all species, except yellow nutsedge. Metolachlor gave excellent control of yellow nutsedge while giving intermediate to good control of all species, except that it was weak on black nightshade and very weak on yellow nutsedge. The dinitro anilines -- ethalfluralin, oryzalin and pendimethalin -- performed somewhat erratically due to the incorporation. Of the 3 compounds, pendimethalin gave the best overall results being primarily weak on nightshade and yellow nutsedge. Ethalfluralin, a normally strong nightshade control chemical, was weak on hairy nightshade in particular, with some black nightshade escapes as well. All herbicides showed excellent safety on the crop. Small populations of sowthistle and pineappleweed were found in the chlorpropham, metolachlor and pendimethalin treatments. In addition some groundsel was found in the chlorpropham, ethalfluralin, oryzalin and pendimethalin plots. (University of California, Cooperative Extension, San Joaquin County, Stockton, CA 95205.)

An evaluation of 6 preplant incorporated herbicides and combinations on fall/winter preformed fallow tomato beds

		Average Weed Control[1/]					
Herbicides	lb/A	Miners Lettuce	Night-shade	Yellow Nutsedge	Shepherds purse	Volun-teer Cereal	Crop Vigor[2/]
Metribuzin	1	10.0	9.4	4.0	10.0	8.9	9.5
Chlorpropham	4	9.6	7.0	2.0	9.5	8.1	9.3
Metribuzin+ Chlorpropham	½+4	10.0	9.1	3.3	10.0	8.4	9.2
Metolachlor	4	7.5	8.5	9.1	8.3	6.3	9.3
Ethalfluralin	2	9.5	4.8	3.0	4.0	6.3	9.5
Oryzalin	2	9.6	4.3	3.0	5.3	5.8	9.5
Pendimethalin	1½	9.6	6.3	4.3	9.1	7.5	9.5
Metribuzin+ Pendimethalin	½+1¼	10.0	9.3	3.6	10.0	8.9	9.3
Check	-	0.0	0.0	0.0	0.0	0.0	9.5

1/ Average of 4 replications where 0 = no weed control and 10 = total weed control.

2/ Average of 4 replications where 0 = crop dead and 10 = vigorous crop growth.

A comparison of 8 layby incorporated herbicides for weed control in processing tomatoes. Mullen, R. J., A. H. Lange, and C. L. Elmore. A trial was established for layby weed control in processing tomatoes at Lodi, California on May 29, 1981. The soil was a Hanford sandy loam with no clods. The soil condition was very dry with an almost talcum-powder consistency. Eight herbicides were applied with a hand-held CO_2 backpack sprayer using directed nozzles when the tomato crop was 6 to 8 inches tall. The treatments were then incorporated with a power tiller to a depth of 3 inches. Irrigation was by furrow, and water was applied to the field 2 days after treatment. Due to the looseness of the soil at treatment, the incorporator knocked some of the stand of tomatoes out, due to difficulty of holding the tractor and the attached incorporator in a straight line down the row. Weed control and crop phytotoxicity ratings were taken on June 22. Weeds present were hairy nightshade, yellow nutsedge, crabgrass and barnyardgrass. Best overall weed control was achieved by metolachlor at 3 lb/A, followed by alachlor at 3 lb/A and EPTC at 3 lb/A. Pebulate at 6 lb/A was effective on yellow nutsedge and fair to good on hairy nightshade. Ethalfluralin at 1½ lb/A showed fair to good activity on hairy nightshade, while Dowco 295 showed good activity on yellow nutsedge. Pendimethalin showed excellent activity on crabgrass and barnyardgrass. All treatments showed excellent crop safety. (University of California, Cooperative Extension, San Joaquin County, 420 S. Wilson Way, Stockton, CA 95205.)

		Average Weed Control Ratings 1/				
Herbicides	lb/A	Hairy Nightshade	Yellow Nutsedge	Crabgrass	Barnyard-grass	Crop Vigor 2/
Pebulate	6	7.6	8.3	5.0	6.5	9.1
EPTC	3	8.4	9.0	8.9	9.0	9.0
Metolachlor	3	8.5	9.5	9.4	9.5	9.0
Alachlor	3	8.3	9.0	9.1	9.3	9.0
Pendimethalin	1½	5.3	5.0	8.8	9.5	9.4
Ethalfluralin	1½	7.5	5.0	6.6	7.8	9.4
Dowco 295	3	5.3	8.5	6.5	7.0	8.6
Trifluralin	3/4	4.0	5.0	7.1	6.8	9.5
Check	-	0.0	0.0	0.0	0.0	9.0

1/ Average of 4 replications where 0 = no weed control and 10 = complete weed control.

2/ Average of 4 replications where 0 = crop dead and 10 = crop growing vigorously.

A weed control trial evaluating different rates of metham fumigant applied as bladed versus narrow band mechanical incorporated treatments. Mullen, R. J., A. H. Lange, and L. Nygren. A weed control trial in processing tomatoes comparing narrow band mechanical incorporation and 6 inch and 12 inch blade layered applications of metham at 3 rates was established near Stockton, California on April 27, 1981. The soil was a Stockton adobe clay with small clods. All treatments were applied utilizing a tractor-mounted tool bar equipped with a 6 inch and 12 inch sweep blade and an in-line, 6-inch mechanical incorporator. The metham treatments, whether bladed or incorporated mechanically, were placed at 1½ to 2 inches deep in the soil. Six replications were treated with 2 replications seeded to tomatoes the day after metham application, and the remaining 4 replications seeded to tomatoes 15 days after the metham treatments. This was done to observe the effect of metham on immediate and delayed crop planting in terms of stand establishment and crop vigor. Weed control ratings and crop phytotoxicity evaluations were made on May 29. The plot was harvested on September 9 and yield and crop maturity data are provided in the table below. Weeds present at rating time were yellow nutsedge and black nightshade. Best overall weed control on both yellow nutsedge and nightshade was due to metham at 160 gal/A, followed by the 80 gal/A rate, and the 40 gal/A rate was quite effective on nightshade, but only partially effective on yellow nutsedge. Metham appeared to have excellent crop safety when the crop was planted 15 days after treatment but severely reduced the stand, as the rate was increased, and the crop was planted the day after treatment. Yields were tremendously reduced and crop maturity was delayed, as the rate of metham was increased, in those plots planted the day after treatment. (University of California, Cooperative Extension, San Joaquin County, 420 South Wilson Way, Stockton, CA 95205.)

Average weed control ratings and counts1/

Treatment	gal/A	Yellow Nutsedge Rating	Yellow Nutsedge Counts	Night-shade Rating	Night-shade Counts	Crop Phyto2/ Planted 1 day after Treatment	Crop Phyto2/ Planted 15 days after Treatment
Metham	40	4.3	90.5	8.5	3.0	4.0	1.0
Metham	80	6.5	51.2	8.5	3.3	6.5	0.7
Metham	160	7.3	47.2	9.5	0.5	7.5	1.0
Check	-	0.0	142.5	0.0	16.5	0.5	0.5

1/ Average of 6 replications where 0 = no weed control and 10 = complete weed control.

2/ Average of 2 replications for 1 day after planting; average of 4 replications for 15 days after planting. Both rated as 0 = crop growing vigorously and 10 = crop is dead.

Comparison of spinning disk (CDA) with conventional (TeeJet nozzle) application of dinoseb in green peas. PEABODY, D. V. A field test was established to compare the effect of very low rates of two dinoseb formulations applied by a spinning disk applicator (CDA) to conventional (TeeJet nozzle) application on broadleaf annual weeds and green peas (cultivar, Darkskin Perfection). All treatments were replicated four times on plots 6 by 40 feet in a randomized complete block design. The soil was a silt loam with 15% sand, 65% silt, 20% clay, 3.1% organic matter and a pH of 6.1. Peas were planted May 1, 1981. Plots were swathed and then thrashed with a Scott FMC Mobile Pea Viner on August 5 and 6, 1981 at a tenderometer reading of 100 to 105. Due to the size of the experiment two replicates were swathed and thrashed on August 5 and two on August 6. Peas were weighed and tenderometer readings made immediately after each plot was harvested. Overall and specific weed ratings were made June 16, 1981 when peas were in the 6 to 7 node stage of growth.

Preemergent treatments (PRE) were made May 15, 1981; postemergent treatments (POE) on May 28, 1981 when peas were in the 5 node stage. Low volume (3 gallons per acre) applications were made with a spinning disk (Micromax) or controlled droplet applicator (CDA). High volume applications (45 gallons per acre) were made through a Spraying Systems TeeJet LP 3001 nozzle tip at 15 psi. Additional application information is presented in the table.

Statistical analysis of the replicated data is given in the table. With standard and recommended rates and times of dinoseb amine treatment there was no difference between CDA and conventional spray applications in regard to pea yields or annual broadleaf weed control. (Note: The general recommended dinoseb amine treatment is either 1.5 lb a.i./A postemergence or 3.0 lb. a.i./A preemergence). However when very low rates of dinoseb are applied by CDA as a postemergent treatment, poorer weed control with concomitant lower pea yields results when compared to conventional spray application (45 gpa). CDA preemergence dinoseb phenol at 3 lb. a.i./A gave as good control as preemergence conventional spray applications at this same rate. In other words these data indicate the postemergent application of dinoseb by means of the spinning disk device (CDA) does not enhance the postemergence activity of this herbicide. On the other hand, no loss of activity was observed with CDA when dinoseb was applied either preemergence or postemergence at recommended rates of application. Since pea injury was minimal with low postemergence rates of dinoseb (low pea yields could be attributed to poor weed control) future tests should evaluate higher postemergent rates of dinoseb with CDA. (Northwestern Washington Research and Extension Unit, Washington State University, Mount Vernon, WA 98273-9788).

Treatments, weed control ratings[1,2,3]
and yields[3] of green peas

Herbicide	Appl time	Rate lb ai/A	Spray vol gpa	Green peas gm/plt	Rating GWR	Rating PAWE	Rating COCW	Rating WIRA	Rating SHPU	Rating PESW	Rating HEBI
untreated check				9220g	1.0d	1.0e	1.0f	3.3b	1.0d	1.0d	1.0e
dinoseb amine	POE	1.5	3	13083a-d	4.5a	4.5ab	4.5ab	5.0a	4.5ab	4.5ab	4.4a-c
dinoseb amine	POE	1.5	45	12993a-d	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
dinoseb amine	PRE	3.0	3	13273a-c	4.7a	5.0a	4.6a	4.9a	5.0a	4.9ab	4.4a-c
dinoseb amine	PRE	3.0	45	14238a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
dinoseb amine	POE	0.156	3	11220d-f	3.3bc	3.8c	2.8de	4.8a	3.1c	4.3ab	3.9c
dinoseb amine	POE	0.156	45	11345c-f	3.8b	3.9bc	3.8bc	4.8a	4.3ab	4.0b	4.5a-c
dinoseb amine	POE	0.3125	3	11725b-f	3.8b	4.0bc	3.4c-d	5.0a	4.0b	4.3ab	4.1c
dinoseb amine	POE	0.3125	45	13085a-d	4.9a	5.0a	4.8a	5.0a	4.9a	4.9ab	4.9ab
dinoseb phenol	PRE	3.0	3	13523ab	4.6a	5.0a	4.8a	5.0a	5.0a	5.0a	4.4a-c
dinoseb phenol	PRE	3.0	45	14700a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	4.9ab
dinoseb phenol	POE	0.156	3	10115fg	2.8c	2.8d	2.3e	5.0a	3.0c	3.0c	3.3d
dinoseb phenol	POE	0.156	45	12180b-e	3.9b	4.1bc	3.5cd	5.0a	4.4ab	4.4ab	4.3bc
dinoseb phenol	POE	0.3125	3	10560e-g	3.8b	3.9bc	3.0c-e	5.0a	3.8bc	4.0b	3.3d
dinoseb phenol	POE	0.3125	45	10373e-g	4.5a	5.0a	4.5ab	5.0a	5.0a	4.9ab	4.5ac
coefficient of variation (%)				10	10	10	13	11	13	12	10

1/ 1 = no control, 2 = poor control, 3 = fair control, 4 = commercially practical control, 5 = weed eradication. Ratings are an average of two separate observations of four replications.

2/ Weed designations: GWR = general or overall weed rating; PAWE = pineappleweed; COCW = chickweed, common; WIRA = radish, wild; SHPU = shepherdspurse; PESW = smartweed, Pennsylvania; HEBI = henbit.

3/ Means within a column followed by the same letter are not significantly different at the 5% level of probability as determined by Duncan's multiple range test.

Annual weed control in ornamental bulbs (iris, tulip and narcissus). PEABODY, D. V. A field experiment was established to evaluate various tank mix and sequential combinations of oryzalin for annual weed control and effect on yield of iris, narcissus and tulip bulbs. All treatments were replicated four times on single row plots 3 feet long (rows 4 feet apart) in a randomized complete block design. All herbicides were applied with a compressed air sprayer mounted on an Allis-Chalmers G tractor in 60 gpa. The soil was a silt loam with 35% sand, 40% silt and 25% clay, 3.1% organic matter with a pH of 5.4. On October 1, 1980, bulbs of the same size range and number were planted in furrows 3 inches deep which were then filled in and hilled with four to five inches of soil so that there was approximately seven inches of soil covering the bulbs. Iris cultivar was Ideal, narcissus was King Alfred and the three tulip cultivars were Godoshnik, Apeldoorn and Lincolnshire. On October 27, 1980, all preemergent treatments were applied and on February 11, 1981, the postemergent applications were made; at this time, iris were 7 inches in height, narcissi were 3 to 4 inches and the tulip cultivars, Godoshnik, Apeldoorn and Lincolnshire were 3, 2 and 1/2 inches in height respectively. All bulbs were dug by hand from mid-June to late July depending on species and variety, cleaned, sorted, and the weight of bulbs from each plot recorded.

Specific and general weed ratings were made July 30, 1981, and are recorded in Table 2. Additional application information is shown in Table 1.

Statistical analysis of the replicated data summarized in Table 1 showed that none of the various oryzalin combinations caused significant yield reductions of iris and narcissus bulbs. However, all oryzalin combinations caused small but significant bulb yield reductions in the early (Godoshnik) and mid-season (Apeldoorn) tulip varieties. Bulb yields of the late (Lincolnshire) variety were not reduced by most of these oryzalin combinations. This greater tolerance of Lincolnshire to oryzalin might be related to stage of growth, i.e., at time of postemergence application more foliage was exposed to the spray treatments in the Godoshnik and Apeldoorn varieties than in the later Lincolnshire.

All of the oryzalin combinations gave excellent control of the annual weed population present with the exception of the low rate of oryzalin alone applied preemergence followed by oryzalin postemergence. (Northwestern Washington Research and Extension Unit, Washington State University, Mount Vernon, WA 98273-9788).

Table 1. Ornamental bulb yields[1/]

Herbicide	Appl time	Rate lb ai/A	Iris yield gm/plt	Narcissus yield gm/plt	Godoshnik yield gm/plt	Apeldoorn yield gm/plt	Lincolnshire yield gm/plt
weedy check			1281b	1657b	1293ab	1234bc	884ab
handweeded check			1896a	2025ab	1392a	1358a	921ab
oryzalin	PRE	1.5	1815a	1961ab	1179bc	1186bc	859ab
oryzalin	POE	1.5					
oryzalin	PRE	1.5	1820a	2053ab	1188bc	1172bc	814b
oryzalin	POE	0.75					
oryzalin	PRE	0.75	1840a	1838ab	1265bc	1213bc	899ab
oryzalin	POE	1.5					
oryzalin	PRE	0.75	1821a	1719b	1182bc	1146bc	853ab
oryzalin	POE	0.75					
oryzalin	PRE	1.5					
dinoseb	PRE	4.5	1890a	2129a	1226bc	1234bc	966a
oryzalin	POE	1.5					
oryzalin	PRE	1.5					
dinoseb	PRE	4.5	1832a	1906ab	1238bc	1149bc	849ab
oryzalin	POE	0.75					
oryzalin	PRE	1.5					
chlorpropham	PRE	4.0	1961a	1814ab	1236bc	1238b	887ab
oryzalin	POE	1.5					
oryzalin	PRE	1.5					
chlorpropham	PRE	4.0	1775a	1874ab	1200bc	1112c	842ab
oryzalin	POE	0.75					
oryzalin	PRE	1.5					
napropamide	PRE	4.0	1893a	1844ab	1241bc	1219bc	861ab
oryzalin	POE	1.5					
oryzalin	PRE	1.5					
napropamide	PRE	4.0	1899a	1761ab	1167c	1136bc	797b
oryzalin	POE	0.75					

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

Table 2. Weed control ratings[1,2,3] in ornamental bulb field test.

Herbicide	Appl time	Rate lb ai/A	Rating					
			GWR	HEMU	COCW	PAWE	SHPU	COGR
weedy check			1.0g	1.0e	1.0c	1.0b	1.0b	5.0a
handweeded check			5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
oryzalin oryzalin	PRE POE	1.5 1.5	4.0e	4.0c	5.0a	5.0a	5.0a	4.0bc
oryzalin oryzalin	PRE POE	1.5 0.75	4.3c-e	4.5a-c	5.0a	4.9a	5.0a	4.5a-c
oryzalin oryzalin	PRE POE	0.75 1.5	3.0f	3.0d	5.0a	4.8a	4.5a	4.5a-c
oryzalin oryzalin	PRE POE	0.75 0.75	4.0e	4.3bc	4.8b	5.0a	4.8a	4.5a-c
oryzalin dinoseb oryzalin	PRE PRE POE	1.5 4.5 1.5	4.5b-d	5.0a	5.0a	5.0a	5.0a	4.6ab
oryzalin dinoseb oryzalin	PRE PRE POE	1.5 4.5 0.75	4.1de	4.8ab	5.0a	4.8a	5.0a	4.4a-c
oryzalin chlorpropham oryzalin	PRE PRE POE	1.5 4.0 1.5	4.1de	4.6ab	5.0a	5.0a	4.9a	3.9c
oryzalin chlorpropham oryzalin	PRE PRE POE	1.5 4.0 0.75	4.1de	4.8ab	5.0a	5.0a	5.0a	4.6ab
oryzalin napropamide oryzalin	PRE PRE POE	1.5 4.0 1.5	4.6a-c	5.0a	5.0a	5.0a	5.0a	4.8a
oryzalin napropamide oryzalin	PRE PRE POE	1.5 4.0 0.75	4.8ab	4.9a	5.0a	5.0a	5.0a	5.0a

1/ 1 = no control, 2 = poor control, 3 = fair control, 4 = commercially practical control, 5 = weed eradication. Ratings are an average of two separate observations of four replications.

2/ Weed designations: GWR = general weed rating; HEMU = mustard, hedge; COCW = chickweed, common; PAWE = pineappleweed; SHPU = shepherdspurse; COGR = groundsel, common.

3/ Means within a column followed by the same letter are not significantly different at the 5% level of probability as determined by Duncan's multiple range test.

Tolerance of 8 groundcover species to Glyphosate. Rice, Robert P. Perennial weeds, particularly cynodon dactylon, are a serious problem in established groundcover plantings and when infestations are severe expensive renovation of plantings may be required. This field test was designed to investigate the tolerance of groundcovers to applications of glyphosate at rates high enough to control perennial weeds. Groundcovers were planted and allowed to become established before glyphosate was applied with a small plot CO_2 sprayer in 230 l/ha of water. Applications were made on November 15 when all species were actively growing. Plots were 2mx7.6m containing 6 plants of each species. The design was a randomized block with 3 replications. Injury was rated on a 0 to 10 scale with 0 representing no injury and 10 representing plant death on December 4 and again on February 25.

Of the eight species tested, Baccharis pilularis, Fragaria chiloensis, Osteospermum fruticosum and Myoporum parvifolium were most sensitive. Gazania ringens, Hypericium calycinum and Drosanthemum hispidum were able to tolerate rates up to 2.2 Kg/ha. Rosmarinus officinalis was extremely tolerant with little injury evident even at the 4.4 Kg/ha rate. Results are presented in Table 1. (Ornamental Horticulture Department, California Polytechnic State University, San Luis Obispo, California 93407).

Table 1 Crop Injury

TMT#	Chemical	Rate Kg salt/ha	Gazania 12/4	Gazania 2/25	Baccharis 12/14	Baccharis 2/25	Hypericum 12/4	Hypericum 2/25	Drosanthemum 12/4	Drosanthemum 2/25
1.	----	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
2.	Glyphosate	1.2	0.0	1.0	0.3	1.3	1.3	1.0	0.7	0.0
3.	Glyphosate	2.2	0.3	1.0	2.0	2.7	1.7	1.0	1.0	0.3
4.	Glyphosate	4.4	0.7	1.7	4.0	6.3	3.3	1.0	3.7	8.0
LSD 5%			---	0.6	1.2	1.1	2.3	---	1.2	0.6

Crop Injury (continued)

TMT#	Chemical	Rate # of salt/A	Fragaria 12/4	Fragaria 2/25	Osteospermum 12/14	Osteospermum 2/25	Rosmarinus 12/4	Rosmarinus 2/25	Myoporum 12/4	Myoporum 2/25
1.	----	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.	Glyphosate	1.0	3.3	0.7	1.3	1.0	0.0	0.0	1.7	1.0
3.	Glyphosate	2.0	4.0	2.0	3.0	3.3	0.0	0.0	3.3	3.0
4.	Glyphosate	4.0	5.0	5.7	5.3	8.0	0.7	0.0	8.7	8.7
LSD 5%			0.6	0.7	0.7	1.3	0.6	---	1.5	2.4

<u>The effect of herbicides and growth regulators on control of dodder in tomato.</u> Saghir, A. R. and A. H. Lange. Two herbicides, namely glyphosate and BAS 9052, and 2 growth regulators BAS 083-01W and mefluidide were applied at various rates after dodder has attached on "Peto 94" tomato grown in the greenhouse. The chemicals were applied in water at 860 L/ha. The response of tomato and dodder were determined by visual ratings and phytotoxicity symptoms were noted. Dodder regrowth and percent tomato kill were evaluated one week after removing all visible dodder from the host.

The results show that dodder was very susceptible to glyphosate at 0.175 Kg/ha and mefluidide at 2.0 Kg/ha. Glyphosate reduced the diameter of stems and tendrils and caused cessation of shoot growth of dodder. Mefluidide caused reduction in length of shoots and stand of the parasite.

One week after removal of dodder from tomato plants, vegetative regrowth of dodder shoots occurred in the glyphosate and BAS 9052 treated pots. In general, the reduction in regrowth coinsided with an increase in the rate of herbicides used; however, normal regrowth appeared in the stems and tendrils from BAS 9052 and the lowest glyphosate rate used, but as the rate of this herbicide was increased, less regrowth occurred which was abnormally branching, stunted and distorted.

Little or no regrowth was observed in the BAS 083-01W and mefluidide treatments. This was due to the complete killing of tomato in the BAS treatment, which could not support the dodder, and as such was not able to regrow; however, the effect was dramatic in the case of mefluidide where the hausoria were completely suppressed, and no dodder regrowth was evident in spite of the low percentage of tomato plants killed. Similar results occurred in glyphosate applications at 0.125 to 0.275 Kg/ha where dodder regrowth was low, and tomato plants were still growing vigorously.
(Faculty of Agricultural and Food Sciences, American University of Beirut, Beirut, Lebanon; and University of California, Kearney Hort. Field Station, 9204 South Riverbend Avenue, Parlier, CA 93648.)

Response of dodder and tomato to foliar applications
of chemicals in the greenhouse

Treatment	Rate (Kg/ha)	Dodder: Condition after 1/ 2 weeks	Dodder: Regrowth 2/ 1 week after removal	Tomato: Phyto after 3/ 3 weeks (%)
Glyphosate	0.025	6.7	10.0	75.0
Glyphosate	0.075	5.0	6.0	50.0
Glyphosate	0.125	4.7	4.0	0.0
Glyphosate	0.175	7.5	4.7	25.0
Glyphosate	0.225	6.5	4.3	12.5
Glyphosate	0.275	4.0	3.2	0.0
BAS 9052	0.5	5.0	4.0	75.0
BAS 9052	2.0	5.5	10.0	75.0
BAS 083-01W	0.05	2.5	0.0	100.0
BAS 083-01W	0.20	5.7	0.0	100.0
Mefluidide	0.5	6.5	0.0	37.5
Mefluidide	2.0	7.5	0.0	25.0
Untreated	-	4.5	0.25	87.5

1/ Visual estimate where 0 = no effect and 10 = good control.
2/ Visual estimate where 0 = no regrowth and 10 = maximum regrowth.
3/ Average of visual evaluation of tomato vigor.

PROJECT 5

WEEDS IN AGRONOMIC CROPS

Pat Rardon - Project Chairman

Annual grass and broadleaf weed control in established dryland dormant alfalfa. Alley, H. P., G. L. Costel, N. E. Humburg and R. E. Vore. Treatments were applied to semi-dormant alfalfa on April 7, 1981. The alfalfa was just breaking dormancy with green leaf growth at the base of the plant. The downy brome had 1 to 2 inch leaf height with field pepperweed in the cotyledon to 1 to 2 inch height. Air temperature was 62 F with a relative humidity of 48% at time of treatment. The soil on the experimental site was classified as a sandy loam (64.0% sand, 20.4% silt, 15.6% clay with 1.4% organic matter and a 6.0 pH). All treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 40 gpa solution at 40 psi pressure. Plots were 9 by 30 ft, arranged in a randomized complete block, with three replications.

Visual weed control evaluations were made July 1, 1981, approximately three months following treatment. The plots were clipped and weights of the alfalfa obtained in the field at time of harvest. Dry soil conditions and the dense stand of downy brome held back the growth of the alfalfa. Pendimethalin/metribuzin, metribuzin and hexazinone gave 100% control of the downy brome; whereas metribuzin and hexazinone were the only two treatments affording 90% or better control of the field pepperweed.

There was no apparent phytotoxicity of any chemical or combination treatment to the alfalfa at time of evaluation. The alfalfa yield was increased from 1200 lb/ A, on the check, to 2100 to 2500 lb/A on plots treated with metribuzin, terbacil and hexazinone. During dry growing conditions the yield of dryland alfalfa can be doubled by effective annual weed control. Yield differences are not as great when early moisture is not limited. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1131).

Weed control and alfalfa yield

Treatment[1]	Rate lb ai/A	Percent Control[2] FP	Percent Control[2] DB	Alfalfa[2] lb/A
pendimethalin 4EC	1.0	33	33	540
pendimethalin 4EC/metribuzin 4F	1.0 + 0.5	82	100	1,380
metribuzin 4F	0.75	90	100	2,500
terbacil 80W	0.5	63	90	2,100
hexazinone 90SP	0.5	95	100	2,500
Check	---	0	0	1,200

[1]Herbicide applications April 7, 1981.
[2]Visual control evaluations and alfalfa harvested July 1, 1981.
Abbreviations: FP = field pepperweed; DB = downy brome.

Comparison of weed control and alfalfa establishment using preplant herbicides versus a nurse crop and 2,4-DB postemergence. Alley, H. P. and N. E. Humburg. In establishment of alfalfa it is a common practice of seeding high rates of alfalfa (10 to 25 lb/A) with a nurse crop such as oats. There are approximately 220,000 alfalfa seeds per pound. A seeding rate of 10 lb/A would give 50 alfalfa seeds per sq ft which is far in excess of what is needed for an ideal alfalfa stand. Previous research has shown that 4 to 6 lb/A alfalfa seed is adequate when a nurse crop is not planted with the alfalfa and annual weeds are controlled with preplant herbicides.

Approximately 0.6 acre plots were established at the Torrington Research and Extension Center in the spring of 1981 to compare the alfalfa establishment, total alfalfa production and weed control under the nurse crop/postemergence herbicide treatment and no nurse crop with preplant herbicide treatment. The preplant herbicides were applied, incorporated with a IHCS-tine harrow and the area seeded with 6 lb/A alfalfa seed. Similar area was seeded with 12 lb/A alfalfa seed and 30 lb/A oats. The nurse crop area was sprayed with 2,4-DB for annual broadleaf weed control.

Quadrat clippings were made on June 25 and August 11, 1981, with broadleaf weeds, grass, oats and alfalfa separated and oven dried. At first harvest the alfalfa seedlings were vigorous and well established in the preplant herbicide treated plots; whereas, in the plot where a nurse crop was planted with the alfalfa, the alfalfa seedlings were small and weak. Total production of weeds, alfalfa and oats was highest from the nurse crop/2,4-DB postemergence plots where 22.4% of the total yield was alfalfa and 68.6% oats. Almost twice as much pure alfalfa, 3179 lb/A, was harvested from the EPTC/profluralin treated area as was harvested from the nurse crop/2,4-DB postemergence treated plots (1622 lb/A). (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1129).

Total production of alfalfa, broadleaf weeds, grass, weeds, oats

Treatment	Rate/A	Oven dry wgt. lb/A				Total[1]	Percent of total[2]		
		Alfalfa	Weeds	Grass	Oats	lb/A	Alfalfa	Weeds	Oats
profluralin	2 pt	1,917	3,669	106	--	5,692	33.7	64.4	--
EPTC	3.5 pt	2,064	3,679	269	--	6,012	34.3	61.2	--
EPTC/profluralin	1.0 + 3.5 pt	3,179	2,508	68	--	5,755	55.2	43.6	--
Nurse crop/2,4-DB	3.0 pt	1,622	208	441	4,959	7,230	22.4	2.9	68.6

[1]Total production includes alfalfa, broadleaf weeds, grass weeds and oats from two clippings.
[2]Percentage of total = percent of each component of the total yield.

Alfalfa yield and longevity of weed control in established dryland alfalfa. Alley, H. P., G. L. Costel, N. E. Humburg and R. E. Vore. Several individual and herbicide combinations were applied as dormant treatments on April 11, 1980, to evaluate their effectiveness toward annual weed control and effects upon alfalfa yields. At time of application the downy brome had 1 leaf/0.25 to 1 inch growth with a minor infestation of kochia, tansy mustard and dandelion. All herbicides were applied with a 6-nozzle knapsack unit in a total volume of 40 gpa water carrier. Plots were 9 by 30 ft, arranged in a randomized complete block, with three replications.

Percent weed control and alfalfa yields were made June 24, 1980, approximately two months following treatment, and weed control evaluations July 1, 1981, approximately one year following treatment. The 1980 weed control and alfalfa yield determinations were made by hand clipping each plot, separating the weeds from the alfalfa, weighing (green weight) and computing yield and percentage weed control by comparing to weights obtained from the untreated check plots. Percentage weed control for 1981 was made by visual evaluations.

Clipping data in year of treatment show that 10 of the 17 treatments resulted in 100% control of the annual weed population. None of the treatments, evaluated one year following application, gave 100% weed control. Individual herbicide treatments of terbacil 80W and pronamide 50W and the combination hexazinone/terbacil were the only treatments giving 90% or greater control one year following treatment.

Alfalfa yields (green weight) ranged from a high of 5540 lb/A where hexazinone was applied at 0.5 lb ai/A to a low of 2840 lb/A from plots treated with metolachlor at 2.0 lb ai/A. The alfalfa yield on the highest yielding plots was 1980 pounds greater than from the untreated plots. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1127).

Alfalfa yield and downy brome control

Herbicide[1]	Rate lb ai/A	Yield lb/A[2]		Percent control	
		Alfalfa	Downy brome	1980	1981[3]
pendimethalin 4EC	1.0	4,620	440	0	0
pendimethalin/metribuzin 4L	1.0 + 0.5	4,580	0	100	32
metolachlor 8E	1.5	3,760	100	53	27
metolachlor 8E	2.0	2,840	420	0	7
metolachlor 8E	2.5	3,720	380	0	30
metribuzin 75DF	0.5	4,660	0	100	60
metribuzin 75DF	0.75	3,340	0	100	43
hexazinone/terbacil 2L	0.5	5,540	0	100	77
hexazinone/terbacil 80W	0.5 + 0.5	5,360	0	100	97
hexazinone/metribuzin 75DF	0.5 + 0.5	4,800	0	100	62
terbacil 80W	0.5	3,940	0	100	83
terbacil 80W	1.0	5,060	0	100	99
metribuzin 4F	0.75	4,900	0	100	80
metribuzin 4F	1.0	4,260	0	100	70
pronamide 50W	1.0	4,160	60	80	98
bromoxynil	1.0	3,960	440	0	0
bromoxynil	0.5	4,200	380	0	0
Check	--	3,560	300	0	0

[1]Dormant treatments applied April 11, 1980.
[2]Plots harvested and separations made June 24, 1980.
[3]Visual evaluations July 1, 1981.

Weed control in established alfalfa. Chase, R. L. and R. W. Gunnell. Fifteen trials were established on dormant or semi-dormant alfalfa in several Utah counties during November and December of 1980. Metribuzin was also applied during the first week of March 1981. Treatments were applied to 10 by 30 foot plots with a bicycle sprayer in a total volume of 20 gpa. There were four replications in a randomized block design.

Visual evaluations of control and crop injury were taken in April or May. No herbicide treatment caused injury to alfalfa plants. Hexazinone gave 100% control of the annual weeds and gave partial control of dandelion. Metribuzin at .5 lb ai/A gave similar results applied either in the fall or in the spring.

Two of the fifteen trials were harvested to determine what effect weeds had on alfalfa yield. The trials were quite weedy with the three annual mustards. The total forage was weighed and the alfalfa separated from the weeds and weighed. The weeds in the untreated check plot caused that plot to yield the most forage, but only 56% of the weight was due to alfalfa, and the rest (44%) was due to weeds. With the exception of pronamide and terbacil, the herbicides generally gave good control so that the percent alfalfa in the harvested plots was close to 100%. The amount of alfalfa in these plots was 30% more than the alfalfa in the untreated check plot, although that plot yielded the most total forage.

Nutritional analyses on the alfalfa compared to the mustards revealed that alfalfa averaged 25.77% protein while the weeds averaged 17.61%. Acid detergent fiber was 31.53% for alfalfa and 39.68% for the weeds. Net energy in Meg Cal/lb was .656 for alfalfa and .521 for the weeds. (Plant Science Department, Utah State University, Logan, UT 84322).

Weed control - established alfalfa 1981

Herbicides[1]	Rate lb ai/A	Percent Weed Control[2] TM(5)[3]	SP(2)	BM(2)	DL(4)	QG(2)	DB(2)	KB(2)
simazine	1.20	92	100	95	11	10	92	3
diuron	1.50	78	98	99	4	7	39	0
metribuzin 75DF	.50	81	100	100	4	13	86	22
metribuzin 75DF	1.00	96	100	100	46	10	99	90
pronamide	1.00	22	34	13	0	51	89	90
pronamide	2.00	39	40	8	2	88	97	98
terbacil	.75	97	100	23	23	50	97	28
terbacil	1.20	100	100	48	52	39	100	25
hexazinone	1.00	100	100	100	60	5	100	97
metribuzin 75DF (spring applied)	.50	77	100	100	39	21	100	89

[1]Herbicide applied during November and December, 1980. Metribuzin also applied in March, 1981.

[2]Visual estimates April or May 1981. Abbreviations: TM = tansymustard; SP = shepherdspurse; BM = blue mustard; DL = dandelion; QG = quackgrass; DB = downy brome; KB = Kentucky bluegrass

[3]The number in parenthesis indicates the number of trials evaluated and averaged for that species. There were four replications.

Postemergence wild oat and green foxtail control in seedling alfalfa. Evans, J. O. and R. W. Gunnell. Several postemergence grass herbicides were evaluated for efficacy in two field trials in northern Utah during the spring and summer of 1981. A test plot in a newly established alfalfa planting with a heavy wild oat (*Avena fatua* L.) infestation (32 plants/square feet) was initiated May 1, 1981 near Richmond, Utah. The second location, also in seedling alfalfa, was located at the USU Research Station in North Logan, Utah. Green foxtail (*Setaria viridis* L.) seed at the rate of four pounds per acre had been broadcast over and incorporated into the plot area prior to planting alfalfa. Green foxtail population at treatment time July 2, 1981 was nine plants per square foot. Treatments were applied at both locations with a bicycle sprayer equipped with 80015 TeeJet nozzles calibrated to deliver 20 gpa at 30 psi. Plot size was 11 feet by 30 feet with four replications in a randomized complete block design.

At the Richmond site, wild oats in the five-leaf stage were outcompeting alfalfa seedlings which were stressed due to a cool, wet spring and heavy wild oat pressure. By one month after application, several herbicide treatments gave excellent wild oat control with a subsequent release of alfalfa plants. In addition to increased alfalfa vigor, broadleaf weeds began growth where wild oats had been eliminated, but the broadleaf competition was not devastating to the crop. By first crop harvest time (late June, 1981), only in successfully treated plots (80% or better wild oat control) were alfalfa plant populations acceptable. Alfalfa weevil activity, however, increased when wild oats were eliminated.

At the North Logan location, green foxtail did not outdistance alfalfa seedlings as had wild oats in the Richmond trial, but alfalfa quality was reduced in untreated areas. Percent control ratings for green foxtail on the average were not as high as wild oat control ratings with the exception of sethoxydim treatments. Yields of total plant material were not significantly different for treated areas or untreated controls, but weeds and alfalfa were not separated and weighed individually.

Both locations produced identical crop tolerance data with no detectable injury for any treatment. (Plant Science Department, Utah State University, Logan, UT 84322).

Postemergence wild oat and green foxtail control in seedling alfalfa.

Treatment	Rate kg/ha	Percent Weed Control 5-30-81 wild oat	7-16-81 green foxtail
CGA82725	0.14	8	3
CGA82725	0.28	28	5
CGA82725	0.56	80	30
CGA82725	0.84	89	60
CGA82725 + 411F	0.14 + 1%	59	60
CGA82725 + 411F	0.28 + 1%	86	68
CGA82725 + 411F	0.56 + 1%	93	84
CGA82725 + 411F	0.84 + 1%	94	83
sethoxydim	0.11	6	10
sethoxydim	0.28	20	65
sethoxydim	0.56	78	81
sethoxydim	1.12	94	90
sethoxydim + 411F	0.11 + 1%	0	73
sethoxydim + 411F	0.28 + 1%	43	89
sethoxydim + 411F	0.56 + 1%	85	94
sethoxydim + 411F	1.12 + 1%	95	88
Ro 138895 + X-77	0.14 + 0.25%	34	20
Ro 138895 + X-77	0.28 + 0.25%	90	45
Ro 138895 + X-77	0.56 + 0.25%	95	76
diclofop methyl	0.84	43	26
SD45328	0.20	48	3
PP009 + X-77	0.28 + 0.25%	35	53
PP009 + X-77	0.56 + 0.25%	88	74
PP009 + X-77	1.12 + 0.25%	95	80
weedy check		0	0

Downy brome control in alfalfa. Handly, J. V., R. H. Callihan, and D. C. Thill. This study was established to determine the effectiveness and crop tolerance to graminicide treatments for the control of downy brome (Bromus tectorum) in alfalfa (Medicago sativa L.). Treatments were applied to 3 x 10 m plots on May 5, 1981 and June 2, 1981. At the time of the first application, the air temperature was 10 C, soil surface temperature was 13 C, relative humidity was 60 percent, and the wind was from the west at 5 km/h. On June 2, the air temperature was 19 C, the soil surface temperature was 16 C, and relative humidity was 60 percent. All herbicides were applied with a backpack sprayer and hand-held boom fitted with 5002 nozzles and calibrated to deliver 187 l/ha. The study was arranged in a randomized complete block with four replications. Visual estimates of crop injury and weed control were made on June 9, 1981. Crop samples were harvested by hand from 1.8 square meters in each plot on July 10, 1981. Alfalfa and downy brome were separated, dried at 40 C for 3 days and weighed.

Results

BAS 9052 (emulsifiable concentrate, 360 g/l) applied at .84 or 1.12 kg/ha, and the split application with this herbicide resulted in high yields and acceptable weed control.

Fusilade (emulsifiable concentrate, 480 g/l) applied at .57 kg/ha produced good weed control and high yields. Fusilade applied at .28 kg/ha resulted in lower yields and less downy brome control.

Mefluidide (soluble, 480 g/l) treatments produced a slight, transient yellowing of the alfalfa plants at both rates tested, and yields were lower than those from any of the other treatments studied.

Glyphosate (emulsifiable concentrate, 360 g/l) was included in this study for grass control comparisons. Downy brome control is not adequately reflected in the tabular data because evaluations were taken while living tissue was still present on many plants, but as environmental conditions warmed, many of these downy brome plants were killed. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Weed Control in Alfalfa
Moscow, Idaho.
1981

Treatment	Rate kg/ha	SR[1]	VR[2]	% Control Downy Brome[4]	Alfalfa Yield kg/ha
Check	-	100 abc[3]	100 abc	0	2658 d
BAS-9052 + Mor-act	.84	107 ab	108 a	67 bc	6254 a
BAS-9052 + Mor-act	1.12	101 bcd	107 a	70 b	5224 abc
Ro-138895 + X77	.84	102 abcd	110 a	47 cdef	3810 bcd
Ro-138895 + X77	1.12	103 abc	105 ab	56 bcde	5635 ab
BAS-9052 + Mor-act/ BAS-9052 + Mor-act	.57/.57	101 bcd	105 ab	48 bcde	4939 abc
Ro-138895 + X77/ Ro-138895 + X77	.57/.57	102 abcd	96 bc	33 f	4714 a-d
mefluidide	1.12	98 cd	93 cd	36 ef	3579 bcd
mefluidide	2.24	96 d	86 d	31 f	3464 cd
fusilade	.28	103 abc	106 ab	43 def	3437 cd
fusilade	.57	108 a	110 ab	65 bcd	4199 bcd
glyphosate	2.24	0 e	0 e	100 a	0 e

[1] Stand reduction - 100 equals complete stand.

[2] Vigor reduction - 100 equals healthy, vigorous plant.

[3] Means followed by the same letter(s) within a column are not significantly different at the .05 level by Duncan's multiple range test.

[4] 100 equals complete kill.

Weed control in new-seeded alfalfa. Humburg, N. E., H. P. Alley and D. F. Ernst. Plots were established at the Torrington Research and Extension Center to evaluate the effectiveness of various herbicides and/or combinations for annual weed control in newly seeded alfalfa (variety Apollo). All herbicides were applied broadcast, full coverage, on 9 by 27 ft plots which were arranged in a randomized complete block with three replications. Treatments were applied with a 6-nozzle knapsack unit calibrated to deliver 40 gpa solution. The preplant treatments were applied April 6, 1981, and incorporated immediately with an IHC S-tine harrow with finger tines.

Weed control and alfalfa stand counts were made on May 29, 1981. Alfalfa stands were reduced 12 to 15% by pendimethalin and pendimethalin/EPTC combination. Alfalfa seedling stands were from 9 to 36% greater in the other herbicide treated plots as compared to the check. There did not appear to be any differences between the alfalfa stands where EPTC or EPTC/R 33865 were used.

Common lambsquarters, hairy nightshade, Russian thistle and annual grass populations were of a magnitude to obtain valid weed control data. No preplant treatment was effective on all weed species. Pendimethalin/EPTC and profluralin/EPTC were the most effective treatments for common lambsquarters with pendimethalin and pendimethalin/EPTC and profluralin/EPTC being the most effective toward redroot pigweed. Pendimethalin, pendimethalin/EPTC and profluralin/EPTC controlled 80 to 84% of the annual grasses. Moderate control of hairy nightshade (70-79%) was obtained with pendimethalin/EPTC, EPTC and EPTC/R 33865. No treatment was effective on the kochia and Russian thistle infestations. (Wyoming Agric. Exp. Sta., Laramie, WY 82071, SR 1130)

Weed control and alfalfa stand

Herbicides	Rate lb ai/A	Alfalfa Stand, %	Percent weed control[1]					
			LQ	HNS	KO	RT	PW	GR
pendimethalin 4EC	1.0	85	69	54	0	23	92	81
pendimethalin/EPTC 7E	1.0 + 2.0	88	80	79	0	50	85	83
EPTC 7E	3.0	118	65	67	0	46	69	74
EPTC 7E	4.0	136	62	79	0	46	8	41
EPTC/R 33865 6:1E	3.0	119	61	79	0	46	0	58
EPTC/R 33865 6:1E	4.0	133	65	70	0	0	0	62
profluralin 4E/EPTC	0.5 + 4.0	109	85	6	66	0	77	84
Check	---	100	0	0	0	0	0	0
plants/linear ft of row, 6 in. band		*6.1*	*2.2*	*2.3*	*0.26*	*0.73*	*0.43*	*2.9*

[1]Abbreviations: LQ = common lambsquarters; HNS = hairy nightshade; KO = kochia; RT = Russian thistle; PW = redroot pigweed; GR = green foxtail, barnyardgrass.

Postemergence green foxtail control in established alfalfa. Parker, R. Several herbicides were applied postemergence to 5-year old, sprinkler irrigated alfalfa on July 16, 1981 to evaluate their effectiveness for the control of green foxtail. The alfalfa (variety, Vernal) was mowed July 10, 1981 and removed. At the time of treatment, the green foxtail was chlorotic and 3 to 4 inches tall, had 3 to 5 leaves and 0 to 1 tiller. The 3- to 4-inch alfalfa stubble was essentially devoid of leaves and had no crown buds elongating at time of treatment. All herbicides were applied with a three-nozzle knapsack sprayer in a total volume of 24 gpa carrier. Plots were 5 by 30 feet, arranged in a randomized complete block with four replications. Air temperature at time of treatment was 83°F, the relative humidity 44%, and the soil was dry to a depth of 6 inches.

Weed control and crop response was determined by visual estimates on August 12, 1981. No herbicide treatment injured alfalfa plants or significantly influenced yields. The green foxtail was controlled best with BAS 9052 OH. (Washington State University, Irrigated Agriculture Research and Extension Center, Prosser, WA 99350)

Postemergence green foxtail control[1/]

Herbicide	Rate lb/A	Percent green foxtail control[2/]
BAS 9052 OH + MorAct 1 qt/A	.25	98 a
BAS 9052 OH + MorAct 1 qt/A	.50	98 a
Ro 13-8895 + X-77 0.25% v/v	.25	0 d
Ro 13-8895 + X-77 0.25% v/v	.50	0 d
Fluazifop + X-77 0.1% v/v	.50	4 d
Fluazifop + X-77 0.1% v/v	1.0	20 c
Asulam	.835	9 d
Asulam	1.67	21 c
Asulam	3.34	85 b
Untreated control	-	0 d

[1/]Herbicides applied July 16, 1981; visual observations August 12, 1981.

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

Annual weed control in irrigated spring barley. Alley, H. P., N. E. Humburg and D. F. Ernst. Plots were established at the Torrington Research and Extension Center to evaluate light rates of the two dicamba formulations, metribuzin and the combination of the two herbicides for weed control in irrigated barley (var. Steptoe). All herbicide treatments were applied with a 6-nozzle knapsack unit in 40 gpa solution. Plots were 9 by 30 ft arranged in a randomized complete block with three replications. Treatments were applied May 13 at which time the barley was in the 2 to 4 leaf stage-of-growth with 3 to 12 inch leaf height. Kochia had 1 to 4 inch, common lambsquarters 1 to 3 inch and redroot pigweed cotyledon to 0.5 to 1 inch growth. The soil was classified as a loamy sand (81.2% sand, 12.0% silt, 6.8% clay, 2.0% organic matter with a 7.6 pH).

Visual weed control evaluations and combine potential evaluations were made July 31. The combine potential ranged from a reading of from 0 to 10. An assignment of 0 = no possibility to harvest; 5 = combine harvesting extremely difficult and 10 = no weeds present that would interfere with the combine. A reading of less than 5 would indicate relatively poor control of a specific weed species and vigor which would prevent harvesting.

No one single herbicide or combination gave outstanding control of the major weed complex. Metribuzin and metribuzin + dicamba 4DMA combination gave 90% or greater control of kochia and common lambsquarters but exhibited weakness toward redroot pigweed as all other treatments did. Dicamba 4DMA and dicamba Na salt formulations gave comparable broadleaf weed control at equivalent rates of application. Rates lower than 0.125 lb ai/A of the two dicamba formulations showed very little activity. Even the 0.125 lb ai/A rate appeared to be too low for the broadleaf weed control desired. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1128).

Weed control and combine potential

Herbicide	Rate lb ai/A	Barley		Weed Control[2]		
		Height in.	Combine[1] potential	KO	LQ	PW
dicamba 4DMA	0.06	21.0	0	17	12	15
dicamba 4DMA	0.125	19.3	2	90	77	67
dicamba 4DMA + metribuzin	0.6 + 0.09	21.3	3.3	85	95	85
dicamba 4DMA + metribuzin	0.6 + 0.125	21.3	5.3	88	96	80
dicamba 4DMA + metribuzin	0.9 + 0.9	20.0	5.3	95	98	65
dicamba 4DMA + metribuzin	0.9 + 0.125	19.0	7.3	93	96	65
metribuzin	0.375	21.3	9.0	99	99	79
dicamba 2Na salt	0.06	19.7	0	13	5	5
dicamba 2Na salt	0.125	16.7	0.3	89	63	50
dicamba 4DMA + MCPA	0.09 + 0.25	19.6	5.3	73	90	50
dicamba 2Na salt + MCPA	0.09 + 0.25	18.7	3.0	67	88	80
Check	---	22.3	0	0	0	0
plants/ft				*1.1*	*1.43*	*0.35*

[1]Combine harvest potential: 0 = no possibility to harvest; 5 = combine harvesting extremely difficult; 10 = no weeds present that would interfere with cutter bar.
[2]Abbreviations: KO = kochia; LQ = common lambsquarters; PW = redroot and prostrate pigweed.

Preemergence and postemergence weed control in irrigated spring barley. Alley, H. P., N. E. Humburg and D. F. Ernst. Several individual and combination herbicides were applied as preemergence on April 6, 1981, and as postemergence on May 12, 1981, to evaluate their effectiveness toward annual broadleaf weed control in spring barley (var. Steptoe) grown under a low-pressure, lateral-move sprinkler system. At time of the postemergence treatments the barley was in the 2 to 4 leaf stage-of-growth with 3 to 12 inch leaf height with kochia having 1 to 4 inch and common lambsquarters 1 to 3 inch growth. All herbicides were applied with a 6-nozzle knapsack unit in a total volume of 40 gpa water carrier. Plots were 9 by 30 ft, arranged in a randomized complete block, with three replications.

Visual weed control and crop combine potential evaluations were made July 31. The combine potential ranged from a reading of from 0 to 10. An assignment of 0 = no possibility to harvest, 5 = combine harvesting extremely difficult and 10 = no weeds present that would interfere with the combine. A reading of less than 5 would indicate relatively poor weed control of a specific species and vigor of growth which would prevent harvesting.

Bromoxynil + 2,4-D amine at 0.38 + 0.38 lb ai/A was the only treatment resulting in 100% control of kochia and common lambsquarters at the evaluation date. The high rating of 5.7, for combine potential, was a result of inadequate control and/or reinfestation of the plot areas by Russian thistle. Bromoxynil at 0.5 lb ai/A, bromoxynil + dichlofop at 0.5 + 1.0 lb ai/A and 0.375 + 0.75 lb ai/A, and dichlofop + clorsulfuron at 1.0 + 0.031 lb ai/A all resulted in 90% or greater control of the two predominant broadleaf weed species. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1134).

Weed control and combine potential

Herbicides	Rate lb ai/A	Barley		Weed control[2]	
		Height in.	Combine[1] potential	KO	LQ
Preemergence					
R 40244 2E	0.5	16.7	2.7	90	89
R 40244 2E	1.0	19.0	1.3	82	67
R 40244 + R 29148 1:1E	0.5 + 0.5	20.0	0.7	85	50
R 40244 + R 29148 1:1E	1.0 + 1.0	18.0	3.0	100	95
Postemergence					
chlorsulfuron	0.016	21.7	3.7	70	98
chlorsulfuron	0.031	17.6	4.7	90	100
chlorsulfuron	0.062	16.6	3.7	80	100
bromoxynil	0.5	20.7	7.3	98	79
bromoxynil + 2,4-D amine	0.38 + 0.38	18.6	5.7	100	100
bromoxynil + MCPA	0.38 + 0.38	24.0	8.3	85	98
bromoxynil + dichlofop	0.5 + 1.0	24.0	8.7	99	96
dichlofop	1.0	24.3	1.3	40	10
dichlofop + bromoxynil	0.75 + 0.375	17.7	6.7	100	98
dichlofop + bromoxynil	1.0 + 0.375	23.3	8	97	93
dichlofop + chlorsulfuron	0.75 + 0.016	18.7	6.0	87	100
dichlofop + chlorsulfuron	1.0 + 0.031	17.0	8.0	92	100
dicamba 4DMA + MCPA	0.06 + 0.25	20.3	4.0	77	83
dicamba 4DMA + MCPA	0.09 + 0.25	20.7	5.0	83	93
dicamba 4DMA	0.09	20.7	2.0	90	60
Check	---	25.0	3.0	--	--
plants/ft²				*0.64*	*1.34*

[1]Combine harvest potential: 0 = no possibility to harvest; 5 = combine harvest extremely difficult; 10 = no weeds present that would interfere with cutter bar.
[2]Abbreviations: KO = kochia; LQ = common lambsquarters.

Selective control of Canada thistle in spring barley and subsequent residual control. Alley, H. P., N. E. Humburg and R. E. Vore. Research reports have indicated the potential of new herbicides and/or combinations for selective control of perennial weeds in small grains which have greater activity than the commonly used phenoxy herbicides. This study was initiated in 1980 to evaluate the effectiveness of three herbicides and/or combinations for selective control of Canada thistle in spring barley and data obtained in 1981 to evaluate residual control from the respective treatments.

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

Visual top growth control of Canada thistle and crop phytotoxicity ratings were made September 11, 1980, and plots harvested September 12, 1980. Residual control evaluations were made June 15, 1981, approximately one year following treatment, by making shoot counts in 3 sq ft quadrats per replication.

Evaluations during the year of treatment showed chlorsulfuron, at light rates of application, preventing seed production with the Canada thistle yellowed. With rates at 0.125 lb ai/A and above the Canada thistle was completely desiccated with root activity prevalent. Dowco 290 at 0.25 and 0.5 lb ai/A resulted in complete burn down and desiccation. The combination of picloram/2,4-D showed excellent activity on the small thistle plants with the larger plants remaining green and succulent.

The poor stand of barley and damage from hail resulted in low yields which are not indicative of the herbicide activity.

Canada thistle shoot counts made during the 1981 season, approximately one year following treatment, indicated that 0.25 lb ai/A of chlorsulfuron was required for effective residual control of Canada thistle. Chlorsulfuron at 0.25 and 0.5 lb ai/A and Dowco 290 at 0.5 lb ai/A gave 99 to 100% shoot control. The picloram/2,4-D combination was not effective one year following treatment. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1132).

Canada thistle top growth and residual control

Herbicides[1]	Rate lb ai/A	Barley bu/A	Canada thistle Phyto[2]	Canada thistle Control[3]	Observations
chlorsulfuron	0.0156	9.8	3.0	26	Severe stunting of volunteer barley - alfalfa killed. Canada thistle plants desiccated (brown) in plots treated with chlorsulfuron at rates of 0.125 lb ai/A and less. Dowco 290 did not show damaging effects on the volunteer barley.
chlorsulfuron	0.031	11.8	5.0	46	
chlorsulfuron	0.062	11.0	5.3	54	
chlorsulfuron	0.125	9.4	6.3	69	
chlorsulfuran	0.25	8.8	8.7	100	
chlorsulfuron	0.5	10.2	10.0	100	
Dowco 290 (M 3972)	0.25	16.5	7.7	75	
Dowco 190 (M 3972)	0.5	15.6	10.0	99+	
picloram/2,4-D amine	0.016 + 0.25	20.6	6.0	0	
picloram/2,4-D amine	0.023 + 0.375	19.6	4.7	0	
Check	---	17.0	0	0	

[1]Herbicides applied July 7, 1980.
[2]Visual phytotoxicity evaluations September 12, 1980. Ratings 0 to 10. 0 = no activity; 10 = complete burn down.
[3]Percent shoot control June 15, 1981.

Postemergence wild oat control in spring barley. Evans, J. O. and R. W. Gunnell. Postemergence wild oat (*Avena fatua* L.) field trials were established in spring planted Steptoe barley at two locations near Richmond and Morgan, Utah. Plots were 11 feet by 30 feet with four replications in a complete random block design. A bicycle sprayer equipped with 80015 TeeJet nozzles calibrated to deliver 20 gpa at 30 psi was used to apply all treatments except those containing barban. Barban applications were made using 73077 TeeJet nozzles at 45 psi and a delivery rate of 5 gpa. At Richmond, barban treatments were applied April 29, 1981 when wild oats were in the one to early three-leaf growth stage with other treatments applied at the three to four-leaf stage on May 9. All Morgan treatments were applied when wild oats were in the late two to full three-leaf stage on May 12. Weather may have played an important role in determining herbicide efficacy since both locations received moderate to heavy rainfall 24 hours prior to and 48 hours after application. Unsettled, cool, rainy conditions then persisted through the first five days of June. Diclofop methyl alone at 1.12 kg/ha and diclofop methyl at 0.84 kg/ha plus bromoxynil at .43 kg/ha gave the best and most consistent weed control while results for other treatments were less impressive. No significant crop injury was noted in any treatment. (Plant Science Department, Utah State University, Logan, UT 84322).

Postemergence wild oat control in spring barley

Treatment	Rate (kg/ha)	Percent wild oat control 7-22-81 Richmond	Percent wild oat control 7-23-81 Morgan
diclofop methyl	0.84	69	80
diclofop methyl	1.12	90	88
difenzoquat (dry) + X-77	1.12 + 0.25%	28	81
difenzoquat (liquid) + X-77	1.12 + 0.25%	73	20
barban	0.43	69	79
SD45328	0.17	33	30
SD45328	0.20	40	51
SD45328 + DPX4189	0.20 + 0.018	33	20
diclofop methyl + DPX4189	0.84 + 0.018	36	63
difenzoquat (liquid) + DPX4189	0.84 + 0.018	15	61
barban + DPX4189	0.43 + 0.018	76	75
SD45328 + bromoxynil	0.20 + 0.43	3	28
diclofop methyl + bromoxynil	0.84 + 0.43	94	86
weedy check		0	0

The influence of DPX4189 residual in spring barley one year after treatment. Evans, J. O. and R. W. Gunnell. A field investigation to determine the efficacy of DPX4189 alone and/or with a surfactant for controlling Canada thistle (*Cirsium arvense* L.) and perennial sowthistle (*Sonchus arvensis* L.) in Steptoe spring barley was established June 8, 1980. Plots were 11 feet by 30 feet with three replications in a random block design. The soil was a silt loam with a pH of 8.3 and an organic matter content of 3.14%. At application, barley plants averaged 4 inches and were in the four-leaf to early tiller growth stage. A moderate but uniform Canada thistle stand and a heavy perennial sowthistle population had infested the plot area. August 1, 1980 weed control readings were encouraging with excellent Canada thistle control for all treatments and DPX4189 plus X-77 treatments giving excellent perennial sowthistle control. There was no indication of crop injury or yield reduction for any treatment during the 1980 crop year. During October, the plot area was plowed to a ten inch depth with a moldboard plow.

In early May 1981, the plot area was again planted to Steptoe barley with a conventional disc-type drill. By early June, barley plants in areas treated with DPX4189 one year prior exhibited injury in the form of chlorosis and stunting, and on June 18, 1981, weed and crop injury ratings showed good to excellent residual weed control with poor crop tolerance. Differences in DPX4189 treatments without surfactant were not significant when compared with DPX4189 plus X-77 surfactant treatments. By harvest time, barley heads had failed to form in all treatments containing DPX4189 at 105 and 140 g/ha and only in the 35 g/ha treatments was there any indication of crop recovery.

The influence of DPX4189 residual in spring barley
one year after treatment

		Barley				Percent Weed Control			
		1980		1981		1980		1981	
Treatment	Rate g/ha	% Std Red.	Inj. Ind.	% Std Red.	Inj Ind.	1/ET	PS	CT	PS
DPX4189	35	0	0	20	5	95	82	40	32
DPX4189	70	0	0	43	7	97	85	75	60
DPX4189	105	0	0	65	8	97	88	90	73
DPX4189	140	0	0	82	9	98	82	91	88
DPX4189 + X-77	35 + 0.33%	0	0	25	5	99	96	58	35
DPX4189 + X-77	70 + 0.33%	0	0	50	8	97	97	85	80
DPX4189 + X-77	105 + 0.33%	0	0	62	8	99	99	98	92
DPX4189 + X-77	140 + 0.33%	0	0	78	9	98	98	98	98
weedy check		0	0	0	0	0	0	0	0

[1]CT = Canada thistle; PS = perennial sowthistle

Canada thistle control in barley. Lish, J. M., D. C. Thill, and R. H. Callihan. Herbicides were applied to spring barley at Bonners Ferry, ID on May 29, 1981, with a CO_2 backpack sprayer equipped with a six nozzle boom calibrated to deliver 2.14 l/ha at 2.8 kg/cm^2 pressure and at a speed of 4.8 km/h. Air temperature and soil temperature at 13 cm was 20 and 16 C, respectively. The experimental design was a randomized complete block with four replications and the plot size was 3 x 10 m. The field had been uniformly treated with 1.4 kg/ha triallate at the end of April. Canada thistle control and barley stand and vigor reduction were evaluated on July 23.

Canada thistle was completely controlled with chlorsulfuron at 0.14 kg/ha. Chlorsulfuron at 0.35 and 0.07 kg/ha reduced Canada thistle 92 and 97%, respectively. All other herbicide treatments were ineffective in controlling Canada thistle. SAN-315 at 2.24 kg/ha and DPX-5648 at 0.035 kg/ha reduced barley stand 8 and 21%, respectively. SAN-315 and both rates of DPX-5648 reduced barley vigor and yield. All other treatments increased yield over the check except 2,4-D and dicamba + MCPA which were not different from the check. (University of Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Canada thistle control in spring barley at Bonners Ferry, Idaho, 1981

Treatment	Rate	Cath	Barley SR	Barley VR	Grain Yield
	(kg/ha)	(%)	----(%)-----		(kg/ha)
check	-	0	0	0	2741
2,4-D	1.69	56	2	1	2953
dicamba	0.14	54	3	0	3162
dicamba	0.28	54	0	1	3152
dicamba + MCPA	0.14 + 0.28	69	0	0	3073
bromoxynil + MCPA	0.13 + 0.13	56	0	0	3253
bentazon	2.24	6	0	1	3119
SAN-315	2.24	62	8	10	2326
DPX-5648	0.18	51	0	22	1815
DPX-5648	0.035	42	21	39	852
chlorsulfuron	0.035	92	0	2	3097
chlorsulfuron	0.07	96	1	1	3179
chlorsulfuron	0.14	100	0	0	3104
$LSD_{0.05}$		30	8	6	354

Harvest aid control of Canada thistle in spring barley. Lish, J. M., D. C. Thill and R. H. Callihan. Herbicides were applied to spring barley (var. Advance) at Southwick, Idaho on July 21, 1981 with a backpack sprayer equipped with a six nozzle boom calibrated to deliver 187 l/ha at 2.8 kg/cm^2 pressure from a CO_2 source. Air temperature and soil temperature at 12 cm were 24 and 22 C, respectively. Canada thistle and barley were in the bud and milk stage, respectively. The experimental design was a randomized complete block with four replications. The plot size was 3 by 10 m. Canada thistle stand and vigor reductions were evaluated on August 10.

There was no stand reduction of Canada thistle. SAN 315 reduced Canada thistle vigor 53%, however, barley yield was also reduced. Chlorsulfuron at 0.0156 kg/ha reduced Canada thistle vigor 33% but there was no difference in yield compared to the check. No treatment increased yield. Dicamba at 0.14 kg/ha, bromoxynil + MCPA, SAN 315, DPX 5648, and chlorsulfuron at 0.0624 kg/ha reduced yield compared to the check (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Canada thistle control in spring barley.

Herbicide Treatment	Rate	Cath SR	Cath VR	Grain Yield
	(kg/ha)	------%	-----	(kg/ha)
check	-	0.0	0.0	1344
2,4-D amine	1.68	20.0	30.0	1116
dicamba	0.14	13.3	20.0	892
dicamba	0.28	15.0	27.0	930
dicamba + MCPA	1.40 + 0.28	13.3	30.0	927
bromoxynil + MCPA	0.13 + 0.13	23.3	27.0	774
bentazon	2.24	13.3	27.0	944
SAN 315	2.24	40.0	53.0	419
DPX 5648	0.0078	8.3	8.0	861
DPX 5648	0.0156	0.0	0.0	1070
chlorsulfuron	0.0312	10.0	12.0	1205
chlorsulfuron	0.0624	11.0	23.0	591
$LSD_{0.05}$		NS	24	356

The effect of herbicides on quackgrass control in spring barley. Lish, J. M., D. C. Thill, and R. H. Callihan. Herbicides were applied to spring barley at Bonners Ferry, Idaho, on May 28, 1981, with a back-pack sprayer equipped with a six nozzle boom calibrated to deliver 187 l/ha at 2.8 kg/cm^2 pressure from a CO_2 source. Soil temperature at 13 cm and air temperature was 22 and 26 C, respectively. Plot size was 3 x 10 m and the experimental design was a randomized complete block with four replications. Barley and wild oat had three to four leaves and three to five leaves, respectively, at the time of application. Weed control and barley injury were evaluated on July 23.

RO 138895 at 1.12 kg/ha resulted in good quackgrass control. All other treatments reduced quackgrass, but did not provide effective control except SSH0860 which was not different from the check. Wild oat was controlled effectively only with RO 138895 at 0.57 kg/ha. Common chickweed increased with treatments that gave good grass control, except the glyphosate treatments which were not different from the check. Barley was completely eliminated with all treatments except SSH 0860. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Quackgrass control in barley at Bonners Ferry, Idaho

Treatment	Rate	Weed Control			Barley
		Qugr	Wioa	Cocw	
	(kg/ha)	-- (% control) --			(% ground cover)
check	2.24	0	0	25	100
glyphosate	2.24	76	75	11	0
glyphosate	3.36	88	75	9	0
BAS 90520H[1]	0.57	54	75	52	0
BAS 90520H	1.12	81	75	75	0
RO 138895[2]	0.57	86	100	75	0
RO 138895	1.12	91	79	100	0
SSH 0860	2.24	10	18	42	85
$LSD_{0.05}$		17	39	48	16

[1] BAS 90520H used with Moract at 0.57 l/ha.

[2] RO 138895 used with X-77 at 0.11 l/ha.

Control of wild oat and broadleaf weeds in spring barley. Morishita, D. W., D. C. Thill, R. H. Callihan and W. J. Schumacher. This study was conducted near Cavendish, Idaho, to determine the effectiveness of preplant incorporated (PPI) and postemergence herbicides applied at four growth stages for wild oat and broadleaf weed control in spring barley (var. Advance). Plots were 3 x 8 m in size with treatments replicated four times in a randomized complete block design. The herbicides were broadcast applied with a CO_2 pressurized knapsack sprayer calibrated to deliver 187.1 l/ha at 2.8 kg/cm^2 and 5 km/h. Soil type at the study area was a silt loam with 6.4% organic matter, pH 7.5, and CEC 3.8 meq/100 g soil. Preplant incorporated herbicides were incorporated twice with a flex-tine harrow at 8 km/h to a depth of 4 cm. Postemergent applications were made at the 1 to 2, 2 to 3, and 3 to 4 leaf stages of wild oat on May 26, June 3, and July 15, respectively. Visual evaluations were made July 14 and scored on a 0-100 scale. Yield data were obtained by harvesting a 12 m^2 area.

Applications of metribuzin at 0.56 kg/ha and fluchloralin + triallate at 0.56 + 1.12 kg/ha resulted in the best control of wild oat. These were followed by trifluralin, fluchloralin + triallate at 0.84 + 1.12 kg/ha, and triallate alone. Broadleaf weed control was best achieved by the chlorsulfuron + difenzoquat and chlorsulfuron + diclofop combinations as well as chlorsulfuron alone at 0.018 and 0.035 kg/ha. Metribuzin at 0.56 kg/ha gave excellent weed control, but severely reduced the crop yield. The chlorsulfuron + difenzoquat tank mixes resulted in the best overall weed control. The combination of chlorsulfuron with difenzoquat appears to enhance the toxicity of difenzoquat on wild oat compared to when it is applied alone.

Chlorsulfuron + diclofop at 0.009 + 1.12 kg/ha treatment resulted in the highest grain yield. This treatment also gave good control of all weed species with the exception of wild buckwheat which had variable population throughout the test area. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Broadleaf weed and wild oat control and spring barley tolerance to several herbicides.

Treatment	Rate	Date of Application	Mayweed SR[1]	Mayweed VR[2]	Field Pennycress SR	Field Pennycress VR	Wild Oat SR	Wild Oat VR	Yield
	(kg/ha)		-----	-----	-----	(%)	-----	-----	(kg/ha)
check	0		0	0	0	0	0	0	1556
chlorsulfuron + difenzoquat	0.009+1.12	6/15	95	95	100	100	70	69	1698
chlorsulfuron + difenzoquat	0.018+1.12	6/15	100	100	100	100	65	87	2100
chlorsulfuron + difenzoquat	0.035+1.12	6/15	99	99	100	100	64	60	2114
chlorsulfuron + diclofop	0.009+1.12	6/3	95	96	100	100	58	53	2326
chlorsulfuron + diclofop	0.018+0.12	6/2	100	100	100	100	66	69	1749
chlorsulfuron + diclofop	0.035+1.12	6/3	100	100	100	100	48	48	1852
chlorsulfuron	0.009	6/3	98	98	100	100	0	0	1867
chlorsulfuron	0.018	6/3	100	100	100	100	0	0	1633
chlorsulfuron	0.035	6/3	100	100	100	100	0	0	1669
difenzoquat	1.12	6/15	0	0	0	0	24	48	1962
diclofop	1.12	6/3	0	0	0	0	45	44	1077
barban + metribuzin	0.28+0.28	5/26	100	100	100	100	25	25	1414
barban + metribuzin	0.28+0.14	5/26	68	68	98	98	13	13	1467
barban + difenzoquat	0.28+0.56	6/15	0	0	0	0	0	0	1687
barban + difenzoquat	0.28+0.28	6/15	0	0	0	0	0	0	1474
barban	0.28	5/26	0	0	0	0	0	0	1791
metribuzin	0.56	5/26	100	100	100	100	100	100	1604
fluchloralin	0.56	5/9	0	0	0	0	25	25	1316
fluchloralin	0.84	5/9	0	0	0	0	50	50	1040
fluchloralin + triallate	0.56+1.12	5/9	0	0	0	25	100	100	1200
fluchloralin + triallate	0.84+1.12	5/9	0	0	0	0	75	75	976
trifluralin	0.56	5/9	0	0	0	0	77	80	1118
trifluralin + triallate	0.56+1.12	5/9	7	0	0	0	65	80	980
triallate	1.12	5/9	0	0	0	0	74	73	1120
$LSD_{0.05}$			12	11	19	23	51	51	581

1 SR = Stand Reduction compared to check

2 VR = Vigor Reduction compared to check

Broadleaf weed and wild oat control and spring barley tolerance to several herbicides (cont.)

Treatment	Rate	Date of Application	Crop SR[1]	Crop VR[2]	Wild buckwheat SR	Wild buckwheat VR	Common lambsquarter SR	Common lambsquarter VR	Henbit SR	Henbit VR
	(kg/ha)		(%)							
check	0		0	0	0	0	0	0	0	0
chlorsulfuron + difenzoquat	0.009+1.12	6/15	8	5	85	95	100	100	90	93
chlorsulfuron + difenzoquat	0.018+1.12	6/15	3	3	70	100	100	100	94	94
chlorsulfuron + difenzoquat	0.035+1.12	6/15	3	3	98	98	100	100	97	96
chlorsulfuron + diclofop	0.009+1.12	6/3	10	10	45	95	95	96	94	94
chlorsulfuron + diclofop	0.018+1.12	6/3	11	13	95	95	100	100	100	100
chlorsulfuron + diclosop	0.035+1.12	6/3	15	13	73	95	100	100	100	100
chlorsulfuron	0.009	6/3	0	1	40	58	73	73	93	95
chlorsulfuron	0.018	6/3	0	1	80	83	99	99	99	99
chlorsulfuron	0.035	6/3	0	2	70	67	100	100	100	100
difenzoquat	1.12	6/15	10	4	0	0	0	0	0	0
diclofop	1.12	6/3	24	23	0	0	0	0	0	0
barban + metribuzin	0.28+0.28	5/26	16	16	0	0	100	100	98	98
barban + metribuzin	0.28+0.14	5/26	14	11	0	0	36	46	68	68
barban + difenzoquat	0.28+0.46	6/15	4	0	0	0	0	0	0	0
barban + difenzoquat	0.28+0.28	6/15	3	1	0	0	0	0	0	0
barban	0.28	5/26	9	3	0	0	0	0	0	0
metribuzin	0.56	5/26	74	53	99	98	100	100	100	100
fluchloralin	0.56	5/9	5	5	75	75	5	8	60	63
fluchloralin	0.84	5/9	18	8	75	75	50	50	95	93
fluchloralin + triallate	0.56+1.12	5/9	15	9	75	75	25	28	0	0
fluchloralin + triallate	0.84+1.12	5/9	19	10	75	75	25	25	100	100
trifluralin	0.56	5/9	13	8	33	33	0	0	33	33
trifluralin + triallate	0.56+1.12	5/9	18	18	67	67	33	33	60	57
triallate	1.12	5/9	10	5	0	0	0	0	25	25
$LSD_{0.05}$			10	9	53	53	38	37	30	29

1 SR = Stand Reduction compared to check

2 VR = Vigor Reduction compared to check

Persian darnel control in dryland spring barley. Rardon, P.L. and M. Kleis. *Lolium persicum* (Persian darnel)has become an increasing problem throughout the dryland small grain areas of Montana. Persian darnel is competitive with both winter and spring grains throughout the state, and has been observed to attain populations of 125 plants per sq. ft.. Cultural practices have been used in the past to obtain some degree of control, however early cultivation followed by delayed seeding may encounter both seeding difficulties and yield reductions. Post emergence chemical control of this problem weed is a desirable alternative.

A series of trials were established throughout Central Montana to determine the effectiveness of post emergence application of diclofop on Persian darnel. All three experiments were applied using a backpack CO_2 sprayer calibrated to apply 10-15 gal. per acre. The plot size was 6.5 ft. by 30 ft. with three replications layed out in a randomized complete block design. Applications of the herbicide were made when the Persian darnel was in the 1.5 to 2 leaf stage of development.

Diclofop was effective in controlling Persian darnel at both the 0.75 and 1.0 lb. a.i. rates. Control progressed slowly, with only 65 percent control occurring within the first two weeks. However, as the growing season progressed control increased as a result of the vigorously growing crop. The addition of one percent surfactant (Renex-77), significantly increased late season control indicating that increased crop competition was not totally responsible for increased late season control. Diclofop possess very acceptable post emergence control capabilities for Persian darnel. (Experiment Station, Montana State University, Moccasin, MT 59462 and American Hoechst Corp., Bozeman, MT 59715).

Post emergence Persian darnel control in barley

Treatment	Rate lb/A	% Average Control @ 2 weeks	@ harvest	% Average injury	Crop yield bu/A
diclofop	0.75	62.7	83.3	2.0	44.3
diclofop	1.0	66.7	88.7	3.0	34.7
diclofop + surfact	0.63	66.7	91.0	3.3	38.6
check	-	0.0	0.0	0.0	31.5

Wild oat and field pennycress control in spring barley. Schumacher, W. J., D. C. Thill, and R. H. Callihan. The study was initiated on April 17, 1981 to evaluate the control of wild oat and field pennycress in spring barley (var. Borah) at Grangeville, Idaho. The first herbicide applications were applied on May 13, 1981 when the wild oats were in the 2 to 3 leaf stage of development using a CO_2 backpack sprayer calibrated to deliver 187 l/ha at a pressure of 2.8 kg/cm_2. Treatments applied were chlorsulfuron, diclofop, chlorsulfuron + diclofop tank mixes, and SD-45328. Air temperature was 17.7 C, soil temperature was 15 C at 15 cm, and the relative humidity was 56%. The second herbicide applications were applied on May 26, 1981 when the wild oats were in the 4 leaf stage of development. Treatments applied were chlorsulfuron, difenzoquat, chlorsulfuron + diclofop tank mixes, and SD-45328. Air temperature was 18.3 C, soil temperature was 21.1 C at 15 cm, and the relative humidity was 85%. The experimental design was a randomized complete block with four replications. Each plot measured 3 by 8 m in size. Visual evaluations of weed control and crop tolerance were made on July 15, 1981. The plots were harvested on August 14, 1981 using a small plot combine.

Tank mixing chlorsulfuron with either difenzoquat or diclofop decreased the control of wild oat but increased the control of field pennycress when compared to difenzoquat or diclofop alone (see Table). The treatment that resulted in the highest relative control of both weeds was chlorsulfuron and difenzoquat at 0.009 + 1.12 kg/ha. The plots treated with SD-45328 on May 26 caused a greater crop injury than when applied on May 13.

All treatments yielded higher than the untreated check with the exception of chlorsulfuron applied at 0.018 kg/ha, although there was no significant difference between the yields (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Wild oat and broadleaf weed control in spring barley

Treatment	Rate	Crop		Wild Oat		Field Pennycress		Yield
		SR[2]	VR[3]	SR	VR	SR	VR	
	(kg/ha)	(%)						(kg/ha)
check	-	0c	0b	0c	0c	0c	0c	3104a
chlorsulfuron + difenzoquat	0.009 + 1.12	10abc	5ab	60abc	87a	100a	100a	3280a
chlorsulfuron + difenzoquat	0.018 + 1.12	9abc	6ab	30abc	77a	100a	100a	3224 a
chlorsulfuron + diclofop	0.009 + 1.12	8abc	8ab	42abc	37abc	100a	100a	3412a
chlorsulfuron + diclofop	0.018 + 1.12	3bc	1ab	47abc	13bc	100a	100a	3427a
chlorsulfuron	0.009	3bc	0b	7bc	0c	100a	100a	3356a
chlorsulfuron	0.018	5abc	0b	0c	0c	100a	100a	2785a
difenzoquat + X-77	1.12 + 0.1%	8abc	5ab	87a	95a	0c	0c	3378a
diclofop	1.12	4bc	1ab	87a	73a	0c	0c	3420a
SD-45328(2-3)	0.17	1bc	0b	67ab	68ab	30bc	28bc	3504a
SD-45328(2-3)	0.2	4bc	4ab	33abc	40abc	28bc	28bc	3583a
SD-45328(2-3)	0.28	3bc	0b	67ab	40abc	42bc	53b	3556a
SD-45328(3-5)	0.17	11ab	5ab	57abc	87a	11bc	9bc	3215a
SD-45328(3-5)	0.2	8abc	4ab	67ab	87a	10bc	10bc	3569a
SD-45328(3-5)	0.28	14a	9a	83a	90a	54b	44bc	3536a

[1] Means followed by the same letter(s) within a column are not significantly differenct at the 0.05 level according to Duncan's multiple range test.

[2] SR = visual estimate of percent of stand reduction when compared to the untreated check.

[3] VR - visual estimate of percent of vigor reduction when compared to the untreated check.

Broadleaf weed control in spring barley. Thill, D. C., W. J. Schumacher, R. H. Callihan, and B. G. Schatt. A study was initiated at Culdesac, Idaho to determine the influence of five different herbicides on broadleaf weed control in spring barley (var. Steptoe). Treatments were applied on May 26, 1981. Air and 15 cm depth soil temperature at the time of application was 20.5 and 20 C, respectively. Relative humidity was 81% with a 5% cloud cover. The crop was in the 4 leaf stage of growth with 1 to 2 tillers. All treatments were applied with a CO_2 backpack sprayer calibrated to apply 187 l/ha at 2.8 kg/cm^2. The experimental design was a randomized complete block with 4 replications and individual plots being 3 x 8 m in size. Visual evaluations were taken June 29, 1981 and the study havested August 11, 1981.

A 100% control of corn cockle was achieved with all treatments with the exception of dicamba at 0.15 kg/ha. The tank mix of metribuzin + bromoxynil at 0.28 + 0.42 kg/ha gave 100% control of the three weed species evaluated but also showed a significant vigor reduction in the crop. The yield, however, was not significantly different from the check. Chlorsulfuron at 0.018 and 0.035 kg/ha also gave 100% control of the three three weed species but also showed signficantly lower crop yields as compared to the check and other treatments. Metribuzin at 0.28 kg/ha showed no crop stand or vigor reduction and statistically 100% weed control with the greatest increase in yield but it was not significantly different from the check (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Broadleaf weed control in spring barley.

Treatment	Rate	Crop		Mayweed		Henbit		Corn Cockle		Yield
		SR[2]	VR[3]	SR	VR	SR	VR	SR	VR	
	(kg/ha)	(%)								(kg/ha)
check	0	0a[1]	0d	0d	0c	0c	0c	0c	0c	3593ab
dicamba	0.15	0a	8cd	43c	45b	60b	70b	73b	68b	3766a
metribuzin	0.15	0a	0d	73b	48b	100a	100a	100a	100a	3517ab
metribuzin	0.28	0a	0d	99a	95a	100a	100a	100a	100a	3662ab
dicamba + metribuzin	0.15+0.15	0a	23a	80ab	68ab	100a	100a	100a	100a	3550ab
dicamba + metribuzin	0.15+0.28	0a	15b	100a	100a	100a	100a	100a	100a	3651ab
metribuzin + bromoxynil	0.28+0.42	0a	13ab	100a	100a	100a	100a	100a	100a	3503ab
chlorsulfuron	0.009	0a	0d	100a	100a	94a	83ab	100a	100a	3401b
chlorsulfuron	0.018	0a	0d	100a	100a	100a	100a	100a	100a	3106c
chlorsulfuron	0.035	0a	3d	100a	100a	100a	100a	100a	100a	3080c
bromoxynil	0.42	0a	0d	96a	60b	98a	78ab	100a	100a	3422b

1 Means followed by the same letter(s) within a column are not significantly different at the 0.05 level of probability according to Duncan's Multiple Range Test.

2 SR = percent stand reduction

3 VR = percent vigor reduction

Effects of postemergence herbicide applications on weed control in large lima and Dark Red kidney beans. Mitich, L. W. and S. A. Fennimore. Experimental herbicides with and without surfactants were tested and their effectiveness compared with standard use registered herbicides.

The trial was planted on June 24, 1981, with 10 treatments and an unweeded control. Four replications were planted in a random block plot design. The plots were 5 feet wide by 25 feet long; row spacing was 30 inches. Water was supplied by furrow irrigation. The postemergence applications were made July 27 when most weeds were approximately 1 inch tall.

In general the limas were more sensitive to the herbicide treatments than the kidneys. Slightly more phytotoxicity occurred from PPG-844 and BASF 9052 in the limas than in the kidneys. There was little variation in the kidneys in the degree of phytotoxicity caused by any of the herbicides, but bentazon caused the least phytotoxicity. PPG-844 at 0.2 lb/A and RH-0265 at 0.25 lb/A gave the best weed control. Redroot and tumble pigweeds were the only weed species within the trial that were presented in significant numbers. (University of California, Cooperative Extension, Davis, CA 95616).

Postemergence herbicides

Herbicide	Surfactant	lb/A	Large lima beans: Mean phyto-toxicity 1/	Large lima beans: Mean pigweed percent control 2/	Dark red kidney beans: Mean phyto toxicity 1/	Dark red kidney beans: Mean percent pigweed control 2/	Yield per plot 3/
PPG-844	.5% X-77	0.1	2.25	77.0	1.75	68.0	6.49
PPG-844	.5% X-77	0.2	2.25	93.3	1.75	92.9	6.78
bentazon	--	0.75	1.00	54.85	1.0	45.8	6.86
bentazon	.5% Agridex	0.75	2.0	62.5	2.0	50.0	6.67
Poast (BASF 9052) + betazon	--	0.5 0.75	1.50	15.4	1.75	28.6	7.71
Maag RO-138895 + Basagran	--	0.375 0.75	2.25	38.5	1.75	35.8	7.74
RH-0265	.5% X-77	0.125	1.75	46.2	1.50	43.0	6.72
RH-0265	.5% X-77	0.25	2.0	77.0	1.75	85.8	6.39
RH-0265	--	0.125	1.75	8.0	1.50	28.6	6.259
RH-0265	--	0.25	1.50	38.5	1.50	14.3	7.10
control	--	--	0	0	0	0	6.92

1/ Phytotoxicity 0 = no phytotoxicity
10 = plant death
(mean for 4 plots)

2/ Number of pigweeds per 100 cm^2 of plot.
(mean for 4 plots)

3/ Yield in pounds

* no yield taken in large limas

Effects of preemergence herbicide treatments in Dark Red kidney and large lima beans. Mitich, L. W. and S. A. Fennimore. A study was established to compare the effectiveness of experimental herbicides with standard use herbicides.

Twenty-two treatments were made in the trial with two control treatments; one weeded and one unweeded control. The herbicides were applied and the beans planted to moisture on June 24, 1981. Applications were made at 30 gpa and the herbicides were incorporated to a depth of 2 inches immediately following application. Four replications were made per treatment and a random block plot design was used.

The limas exhibited greater phytotoxicity to the herbicides than the kidneys. EPTC and combinations of EPTC provided the greatest degree of phytotoxicity in the limas and kidneys, while metolachlor and alachlor + ethalfluralin gave the least. All treatments in the kidney and lima beans gave very good pigweed control with the exceptions of vernolate at 3 lb/A, and in the kidneys NC-20484 at 0.75, 1.0, and 2.0 lb/A which gave little pigweed control. None of the treatments caused a significant effect on yield. (University of California Cooperative Extension, Davis, CA 95616).

Preplant incorporated herbicides in large limas and Dark Red kidney beans

		Large lima beans		Dark Red kidney beans		
Herbicide	lb/A	Mean phyto-toxicity per plot 1/	% weed control (pigweed) 2/	Mean phyto-toxicity per plot 1/	% weed control (pigweed) 2/	Yield in pounds 3/
vernolate	3.00	2.75	84.6	1.50	80.0	7.89
vernolate	4.00	3.50	100.0	1.25	100.0	7.65
EPTC	3.00	4.75	93.4	1.75	100.0	7.58
trifluralin	0.75	2.00	100.0	1.50	100.0	7.27
trifluralin +EPTC	0.5+1.5	4.00	100.0	2.25	100.0	6.91
metolachlor	2.50	1.75	93.4	0.75	100.0	6.97
pendimethalin	0.75	2.75	84.6	1.50	93.4	6.15
ethalfluralin	1.50	2.00	100.0	1.00	100.0	7.84
NC-20484	0.75	2.00	.0	0.75	80.0	8.18
NC-20484	1.00	3.00	23.1	2.00	80.0	7.21
NC-20484	2.00	3.00	47.2	1.00	80.0	6.60
NC-20484	3.00	3.00	69.3	1.50	100.0	7.90
alachlor	3.00	2.50	84.6	1.25	100.0	7.62
MON-097	1.00	2.00	93.4	1.00	100.0	6.35
MON-097	2.00	3.00	100.0	2.25	100.0	7.09
alachlor +trifluralin	3.0+0.5	2.00	93.4	2.00	100.0	7.39
alachlor +ethalfluralin	3.0+1.5	1.75	93.4	1.00	100.0	6.60
PPG-844	0.50	2.25	93.4	1.00	74.4	7.34
PPG-844	1.00	2.50	93.4	2.00	100.0	6.89
naptalam	2.00	1.75	100.0	2.00	100.0	7.13
naptalam	3.00	2.75	93.4	2.00	100.0	6.67
naptalam	4.00	2.75	100.0	1.75	100.0	6.87
control (weeded)	-	0.75	100.0	0.75	93.4	7.51
control (unweeded)	-	.50	.0	1.00	0.0	6.62

1/ no phytotoxicity = 0
plant death = 10

2/ degree of control of pigweed based on a count of the number of pigweeds per 100 cm^2 of plot

3/ pounds per plot
plot size: 5'x25' = 125 ft^2

Effects of postemergence herbicide treatments in Light Red Kidney beans. Mitich, L.W., M.W. Canevari, and S.A. Fennimore. Experimental herbicides were evaluated and their effectiveness compared with standard use herbicides.

The San Joaquin County, California, trial consisted of 13 treatments, including a control. A random block plot design with 4 replications per treatment was used. The plots, 5 feet wide by 25 feet long, consisted of a single twin row bed. The trial was planted on June 29, 1981, and the postemergence treatments were applied on July 17 with a CO_2 backpack sprayer. The application rate was 50 gpa.

All treatments except fluazifop and BASF 9052 gave excellent or good control of nightshade. Ro 13-8895 and BASF 9052 gave no purslane control, while BASF 9052 + bentazon and BASF 9052 + fluazifop gave moderate control. All other treatments gave complete or nearly complete control of purslane. Ro 13-8895, BASF 9052, BASF 9052 + bentazon, bentazon, Ro 13-8895 + bentazon, and fluazifop did not cause significant injury. All other treatments caused moderate to severe crop damage. (University of California Cooperative Extension, Davis and Stockton CA 95616).

San Joaquin County postemergence herbicide treatments; the degree of weed control in Light Red Kidney beans

Treatment	lb/A	% Nightshade control[1]	% Purslane control[1]	Crop Vigor[1,2]
Maag Ro 13-8895	0.5	0	0	9.0
BASF 9052	0.5	20	0	9.5
BASF 9052 + bentazon	0.5 + 0.75	98	84	8.9
bentazon	0.75	100	96	8.8
PPG 844 + bentazon	0.2 + 0.75	100	100	4.3
Maag Ro 13-8895 + bentazon	0.375 + 0.75	99	96	7.9
NC 10978	0.5	100	98	6.0
RH 0265 + X-77	0.125 + 1/4%	100	100	6.2
RH 0265 + X-77	0.25 + 1/4%	100	100	3.8
RH 0043 + X-77	0.125 + 1/4%	100	100	5.0
RH 0043 + X-77	0.25 + 1/4%	100	100	5.5
fluazifop + X-77	0.5 + 1/4%	60	58	9.2
control		0	0	9.3

1 Average of 4 replications.
2 10 = crop growing vigorously.
0 = crop dead.

Effects of preemergence herbicide treatments in Light Red kidney beans. Mitich, L. W., W. M. Canevari, and S. A. Fennimore. Experimental herbicides were evaluated and their effectiveness compared with standard use herbicides.

The trial, located in San Joaquin County, California, contained 14 herbicide treatments and a control. A random block plot design was used and the trial was replicated 4 times. The treatments were applied at 50 gpa with a CO_2 backpack sprayer on June 29, 1981. All treatments were incorporated to a depth of 3 inches with a power incorporator immediately following application and planted the same day.

Nightshade control was greatest with alachlor, metolachlor, pendimethalin + metolachlor, and MON-097. All other herbicides gave only moderate control of nightshade, while trifluralin gave the poorest control. Ethalfluralin, trifluralin, trifluralin + EPTC, NC-20484 at 2.0 lb/A, and MON-097 gave the greatest purslane control. All other herbicides provided moderate to poor control of purslane with naptalam at 1.5 lb/A and EPTC giving the least control. None of the treatments inhibited crop vigor significantly with the exception of naptalam at 3.0 lb/A. (University of California, Cooperative Extension, Davis, CA 95616).

San Joaquin County 1981 trial,
preemergence incorporated herbicides; the degree
of weed control in Light Red kidney beans

Herbicide	lb/A	% nightshade control[1/]	% purslane control[1/]	crop[1/] vigor[2/]
alachlor	3.0	90.0	73.0	9.1
metolachlor	2.5	91.0	66.0	9.3
EPTC	3.0	76.0	28.0	9.1
ethalfluralin	1.5	65.0	97.0	9.4
pendimethalin	0.75	48.0	60.0	9.5
trifluralin	0.75	30.0	91.0	9.5
trifluralin + EPTC	0.5+1.5	64.0	90.0	9.3
pendimethalin + metolachlor	0.75+2.5	86.0	79.0	9.3
NC-20484	1.0	35.0	50.0	9.4
NC-20484	1.5	58.0	75.0	9.4
NC-20484	2.0	60.0	85.0	9.3
naptalam	1.5	55.0	33.0	8.3
naptalam	3.0	60.0	53.0	6.1
MON-097	3.0	89.0	95.0	8.0
control	-	5.0	5.0	9.5

1/ average of 4 replications
100% = completely controlled
0% = not controlled

2/ 10 = crop growing vigorously
0 = crop dead

Evaluation of preplant incorporated herbicide treatments in small lima beans. Mitich, L. W., N. L. Smith, and S. A. Fennimore. The trial was established on the Tarke Brothers Farms in Sutter County, Calif., to compare the relative effectiveness of several experimental herbicides with standard use herbicides.

The herbicides were applied and incorporated to a depth of 2 inches, and the beans were planted on June 1, 1981. Plots were 15 feet wide by 20 feet long with 30 inch rows, replicated four times in a complete random block plot design. Water was supplied by sprinkler irrigation.

Jimsonweed was the only weed abundant within the trial. The table shows that most of the treatments gave good to excellent control of jimsonweed while pendimethalin and trifluralin gave the least control. (University of California, Cooperative Extension, Davis, CA).

Jimsonweed control in small lima beans
with preplant incorporated herbicides

Herbicides	lb/A	% Jimson-weed control 1/,2/,3/
alachlor	3.0	90.0ab
metolachlor	2.5	85.0ab
pendimethalin	0.75	80.0 b
ethalfluralin	1.5	97.5a
trifluralin	0.75	82.5 b
MON-097	1.5	95.0ab
MON-097	3.0	95.0ab
NC-20484	1.0	92.5ab
NC-20484	2.0	90.0ab
NC-20484	3.0	97.5a
naptalam	2.0	97.5a
naptalam	4.0	97.5a
naptalam	6.0	97.5a
trifluralin + alachlor	0.75 + 3.0	97.5a
ethalfluralin + alachlor	1.5 + 3.0	92.5ab
control	-	65.0 c 4/

1/ the mean average of 4 replicated treatments.

2/ 100% = completely controlled
0.0 = not controlled

3/ means followed by the same letter(s) are not significantly different at the .05 level according to Duncan's multiple range test.

4/ control did not equal zero because of cultivation by the grower.

Preemergence herbicide evaluation in two row spacings of fababeans. PEABODY, D. V. A field test was established to determine the weed control effectiveness and the selectivity of three preemergence herbicides to fababeans grown at two row spacings. All treatments were replicated four times on plots 7 by 15 feet in a randomized complete block design. The soil was a silt loam with 20% sand, 65% silt, 15% clay, 3.2% organic matter and a pH of 6.1. Fababeans (cultivar, Canada No. 1) were planted April 17, 1981 with a Nordsten grain drill at two row spacings, 10 and 20 inches which resulted in a stand of 211,000 plants and 203,000 plants per acre respectively. All bean plants in an area 3 by 10 feet were cut by hand and thrashed in a Vogle Plot Thrasher on September 16, 1981. Beans were dried, cleaned and the weight of beans per plot was recorded. Overall and specific weed ratings were made June 15, 1981 when beans were 4 to 6 inches in height.

All herbicides were applied preemergence to beans and weeds on April 23, 1981 in 60 gpa. Additional application information is presented in the table.

Statistical analysis of the replicated data are summarized in the table. Higher yields per unit area were obtained from the 10 inch row spacing (211,000 plants per acre) as compared to the 20 inch spacing (203,000 plants per acre). With either row spacing none of these preemergence herbicide treatments caused any significant yield or germination reductions of beans. However oryzalin resulted in less and generally unsatisfactory annual weed control than either simazine or dinoseb phenol at the two higher rates. Based on the results of this test, both dinoseb phenol and simazine can be used safely and effectively as preemergence herbicides in faba beans. (Northwestern Washington Research and Extension Unit, Washington State University, Mount Vernon, WA 98273).

Treatments, yield data,[3/] germinations[3/] and weed control data[1,2,3/] of 1981 fababean field test

Herbicide	Row space in	Rate lb ai/A	Bean yield gm/plt	Faba-bean germ %	Rating GWR	Rating PESW	Rating PAWE	Rating COLQ	Rating HEBI	Rating COCW	Rating SHPU
weedy check	10		1757a	90a	1.0f	1.0e	1.0d	1.0d	1.0g	1.0d	1.0e
handweeded check	10		1743a	80ab	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
dinoseb phenol	10	1.25	1595a	88a	2.3e	2.0d	4.5ab	4.3b	2.0f	3.8bc	5.0a
dinoseb phenol	10	2.5	1574a	84ab	3.8b-d	3.8bc	4.5ab	5.0a	3.3e	4.0a-c	5.0a
dinoseb phenol	10	5.0	1642a	85ab	4.0bc	5.0a	5.0a	5.0a	3.9c-e	4.8a	5.0a
dinoseb phenol	10	10.0	1486a	88a	5.0a	5.0a	5.0a	5.0a	4.8ab	5.0a	5.0a
oryzalin	10	0.75	1667a	88a	3.8b-d	4.0b	4.8a	4.3b	4.0b-d	4.0a-c	4.0c
oryzalin	10	1.5	1701a	86ab	4.3b	4.0b	4.5ab	4.8ab	4.6a-c	4.8a	4.3b
simazine	10	0.8	1551a	89a	4.9a	5.0a	5.0a	5.0a	4.6a-c	5.0a	5.0a
simazine	10	1.6	1479a	83ab	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
weedy check	20		999b	80ab	1.0f	1.0e	1.0d	1.0d	1.0g	1.0d	1.0e
handweeded check	20		945b	80ab	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
dinoseb phenol	20	1.25	974b	84ab	2.0e	1.5de	4.5ab	4.5ab	1.5fg	3.5c	5.0a
dinoseb phenol	20	2.5	1083b	79ab	3.6cd	3.3c	4.3ab	5.0a	3.4de	4.5ab	5.0a
dinoseb phenol	20	5.0	996b	79ab	4.1bc	5.0a	5.0a	5.0a	4.0b-d	5.0a	5.0a
dinoseb phenol	20	10.0	931b	84ab	5.0a	5.0a	5.0a	5.0a	4.9a	5.0a	5.0a
oryzalin	20	0.75	995b	88a	3.3d	3.3c	3.3c	3.3c	3.3e	3.3c	3.3d
oryzalin	20	1.5	910b	81ab	3.8b-d	3.8bc	3.8bc	4.8ab	4.5a-c	4.8a	3.3d
simazine	20	0.8	1016b	75b	4.9a	5.0a	5.0a	5.0a	4.6a-c	5.0a	5.0a
simazine	20	1.6	1114b	81ab	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
coefficient of variation			15	8	10	12	13	9	12	14	4

1/ 1 = no control, 2 = poor control, 3 = fair control, 4 = commercially practical control, 5 = weed eradication. Ratings are an average of two separate observations of four replications.

2/ Weed designations: GWR = general or overall weed rating; PESW = smartweed, Pennyslvania; PAWE = pineappleweed; COLQ = lambsquarters, common; HEBI - henbit; COCW = chickweed, common; SHPU - shepherdspurse.

3/ Means within a column followed by the same letter are not significantly different at the 5% level of probability as determined by Duncan's multiple range test.

Control of downy brome and windgrass in Kentucky bluegrass. Handly, J. V., R. H. Callihan, and D. C. Thill. The objectives of this study were to screen various registered and experimental herbicides for crop tolerance and grass control in the production of bluegrass seed. The plots were established at Post Falls, Idaho on a loam soil with a C.E.C. of 23.7, pH of 6.3, and an organic matter of 5%. All herbicides were broadcast with a knapsack sprayer fitted with 8004 nozzles and calibrated to deliver 374 L/ha. The study was arranged in a randomized complete block with 3 replications and a plot size of 2.8 by 9 meters. Applications while the bluegrass was dormant were made on February 23, 1981. The air temperature was 12C, the soil surface temperature was 43C, and the soil temperature at 12 cm was 4C. The relative humidity was 72%. Spring treatments while the bluegrass was actively growing were made on April 21. The air temperature was 13C, the soil surface temperature was 12C, and the soil temperature at 12 cm was 10C. The relative humidity was 60%. Visual estimates of crop injury and weed control were made on May 27. An area of .5 square meters was harvested by hand from each plot on July 6, 1981.

Although differences in crop heading were seen, none were significant. Excellent control of downy brome and windgrass was observed in plots treated with glyphosate (emulsifiable concentrate 360 g a.i./L) at .57 kg/ha and paraquat (soluble 240 g/L) at .57 kg/ha. Excellent control of windgrass was also seen in plots treated with terbacil (wettable powder 80% a.i.) at 1.12 kg/ha, diuron (wettable powder 80% a.i.) at 1.12 kg/ha, diuron (wettable powder 80% a.i.) at 3.36 kg/ha, metribuzin (flowable 480 g a.i./L) at .42 kg/ha tank mixed with bromoxynil (emulsifiable concentrate 240 g a.e/L) at .42 kg/ha, R-40244 (emulsifiable concentrate 240 g a.i./L) at .57 kg/ha, chlorsulfuron (wettable powder 75% a.i.) at .0364 kg/ha, and ethofumesate (emulsifiable concentrate 200 g a.i./L) at 1.12 kg/ha.

Yields were significantly lower with treatments of paraquat at .57 kg/ha and glyphosate at .57 kg/ha which reflect the injury observed in those plots. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide Screening Trial in Bluegrass

Treatment	Rate kg/ha	% Headed[1]	% Control[2] Downy Brome	Windgrass	Yield kg/ha
check	-	0 a[3]	0 d	0 c	1109 a
dicamba	.57 d[4]	5 a	33 cd	50 b	715 ab
dicamba	1.12 d	3 a	33 cd	67 ab	715 ab
terbacil	1.12 d	7 a	70 abc	98 ab	905 ab
diuron	3.36 d	0 a	50 abcd	100 a	1073 a
metribuzin	.42 d	2 a	0 d	83 ab	766 ab
metribuzin + bromoxynil	.42 + .42 d	17 a	33 cd	100 a	810 ab
R-40244	.57 d	13 a	47 abcd	93 ab	985 a
MSMA	4.48 s	8 a	40 bcd	53 ab	547 b
chlorsulfuron	.0364s	10 a	80 abc	93 ab	1095 a
chlorsulfuron	.07 s	8 a	40 bcd	83 ab	970 a
ethofumesate	1.12 d	7 a	30 cd	97 ab	759 ab
paraquat	.57 d	15 a	100 a	100 a	167 c
glyphosate	.57 d	13 a	98 ab	100 a	55 c

1/ Visual estimation of panicle number compared to check plots.

2/ 0, no control. 100, complete control.

3/ Means within a column followed by the same letter are not significantly different at the .05 level by Duncan's multiple range test.

4/ d, dormant application. s, spring application.

Ethofumesate for grass weed control in Kentucky bluegrass seed crop. Handly, J. V., R. H. Callihan and D. C. Thill. This study was established on February 23, 1981 to study the effects of the herbicide ethofumesate for grass weed control and crop tolerance in irrigated bluegrass (*Poa pratensis* L.) (var. Nugget). All treatments were broadcast with a knapsack sprayer and hand-held boom equipped with 8004 nozzles and calibrated at 374 l/ha. The soil at this location is a loam with a C.E.C. of 23 meq/100 g soil, pH of 5.1, and an organic matter of 5%. Application of herbicides on the crop and weed species in the dormant stage was made on February 23, 1981. Air and soil temperatures were 15.5 and 5.5 C at 12.7 cm, respectively, with relative humidity at 62% and 20% cloud cover. There was wind out of the east at 4 km/h, but no dew present. Application of herbicides on the crop and weed species in the active growth stage was made on April 21, 1981. Relative humidity was 60% and cloud cover 10% at time of application, with air and soil temperatures 13 C and 10 C at 13 cm, respectively and winds from the east at 3 km/h. The experiment design was a randomized complete block replicated three times; plot size was 2.8 x 9 m. Weed control data were taken on May 5, 1981. Seed was harvested from 1.8 square meters in each plot on July 6, 1981.

Applications of 1.1 kg/ha terbacil (wettable powder, 80% a.i.) and 3.36 kg/ha diuron (wettable powder, 80% a.i.) were used as standards in this experiment. These gave excellent control on windgrass, did not reduce crop vigor, but provided little or no control of Canada bluegrass. Yields from these two treatments were not significantly different from the check.

Ethofumesate (emulsifiable concentrate, 200 g/l) treatments applied during the dormant stage of the crop and the ethofumesate treatments applied in the spring during the active growth stage of the crop and weeds produced increased weed control with increased dosage of the herbicide. Correspondingly, percent heading and crop yield decreased with increased herbicide dosage. Split application (one in the dormant stage and one in the active growth stage) of two treatments of ethofumesate produced similar relationships. Ethofumesate at 0.57 kg/ha applied during the active growth stage of the crop allowed higher crop yield with only minimal weed control, while ethofumesate at 2.24 kg/ha applied either in the dormant or active growth stage of the crop or the split application of ethofumesate at 1.12 kg/ha produced moderate to excellent weed control, but severely reduced yields. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Ethofumesate for grass weed control in bluegrass
Post Falls, Idaho
1981

Treatment	Application[4]	Rate kg/ha	% Headed[1]	% Control[3] Canada B.G.	Windgrass	Seed Yield kg/ha
check	-	-	100 a[2]	0 b	0 d	1409 a
ethofumesate	d	0.57	100 a	60 ab	20 d	971 abc
ethofumesate	d	1.12	72 b	63 ab	55 bc	686 abc
ethofumesate	d	2.24	27 c	83 a	78 ab	576 bc
ethofumesate	d/s	0.57/0.57	83 ab	10 b	33 cd	365 c
ethofumesate	d/s	1.12/1.12	42 c	52 ab	58 abc	262 c
terbacil	d	1.12	100 a	30 ab	92 a	839 abc
diuron	d	3.36	100 a	0 b	88 ab	751 abc
ethofumesate	s	0.57	87 ab	33 ab	5 d	1284 ab
ethofumesate	s	1.12	80 ab	0 b	8 d	985 abc
ethofumesate	s	2.24	33 c	33 ab	28 cd	379 c

[1] Visual rating of panicle number expressed as percentage of heads in check plots.

[2] Means within a column followed by the same letter are not significantly different at the 0.05 level of probability by Duncan's multiple range test.

[3] 0 = 0% control, 100 = 100% control.

[4] Dormant (d) spring (s) applications.

Control of field sandbur in sprinkler-irrigated corn with preemergence herbicide treatments. Humburg, N. E. and H. P. Alley. An experiment to evaluate preemergence herbicide treatments for controlling field sandbur in field corn was established in eastern Wyoming in 1981. The texture of the soil was sand (89.2% sand, 6.0% silt and 4.8% clay) with 7.8 pH and 1.2% organic matter. Plots of 1-sq rod area were arranged in a three-block, randomized complete block experimental design. Herbicides were applied June 3, 1981, with a hand-carried sprayer with a 6-nozzle boom. Herbicide-water solution was broadcast at 40 gpa to surface soil that was dry to 2 inches depth. Weather conditions were: air temperature, 65 F; relative humidity, 61%; and wind velocity of 6 to 8 mph. Soil temperatures were 80, 74, 64 and 60 F at the surface and depths of 1, 2 and 4 inches, respectively. The field was irrigated with a center-pivot sprinkler system.

Control of field sandbur was visually evaluated on June 25, 1981. Untreated check plots had 45 field sandbur plants per sq ft. Control ranged from 5 to 85% in herbicide-treated plots, with the best treatment being alachlor + cyanazine at 3.0 + 1.25 lb/A. On September 2, field sandbur and corn were measured for height and control of field sandbur was visually evaluated. Field sandbur was stunted slightly by metolachlor + atrazine at 3.0 + 1.0 lb/A, but was severely stunted by PPG-844 at 0.5 and 1.0 lb/A, resulting in heights of 13 to 15 and 7 to 8 inches, respectively. Height of corn was influenced principally by competition from field sandbur. Corn was 30-in tall in the check plots, but attained a height of 57 inches in plots of the best herbicide treatment, metolachlor + cyanazine at 3.0 + 1.25 lb/A. All herbicide treatments gave poor control of field sandbur late in the season; control ranged from 5 to 25%. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1140)

Control of field sandbur in sprinkler-irrigated corn
with preemergence herbicide treatments

Herbicides[1]	Rate lb/A	Field Sandbur[2] Control, % June 25	Sept. 2	Height in	Corn Height[3] in
metolachlor + atrazine	1.25 + 1.0	35	15	20-24	47
metolachlor + atrazine	1.5 + 1.2	50	15	20-24	46
metolachlor + atrazine	2.0 + 1.0	40	15	20-24	44
metolachlor + atrazine	3.0 + 1.0	55	20	19-23	49
metolachlor + cyanazine	2.0 + 1.25	50	15	20-24	42
metolachlor + cyanazine	3.0 + 1.25	55	15	20-24	43
metolachlor	3.0	45	15	20-24	40
alachlor + atrazine	3.0 + 1.0	65	20	20-24	47
alachlor + cyanazine	3.0 + 1.25	85	25	20-24	57
alachlor	3.0	50	5	20-24	43
PPG-844 + metolachlor	0.5 + 2.5	55	15	19-23	44
PPG-844	0.5	5	5	13-15	33
PPG-844	1.0	45	15	7-8	48
Check (no treatment)	---	0	0	20-24	30
plants/sq ft		*45*			

[1]Herbicides applied June 3, 1981.
[2]Field sandbur control was visually evaluated. Height was measured Sept. 2, 1981.
[3]Corn height at flag leaf was measured Sept. 2, 1981.

Control of field sandbur in sprinkler-irrigated corn with preplant incorporated herbicides. Humburg, N. E. and H. P. Alley. Research plots for evaluating preplant incorporated herbicides for the control of field sandbur in field corn were located near Lusk, Wyoming. Plots were on sand soil (89.2% sand, 6.0% silt and 4.8% clay) of 7.8 pH and 1.2% organic matter. Herbicides were applied and incorporated on May 15, 1981. A hand-carried 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: sky with partial high haze; air temperature, 52F; relative humidity, 69%; and wind of 2 to 5 mph velocity. Temperatures of soil at the surface and depths of 1, 2 and 4 in were 69, 66, 58 and 51F, respectively. Corn was planted May 29, 1981, in 30-in rows. Irrigation was by center-pivot sprinkler.

Treatments were evaluated on June 25, 1981, 41 days after herbicides were applied. Plant counts were used for calculation of control percentages. Untreated check plots averaged 70 field sandbur plants/sq ft. Control ranged from 51 to 98% for herbicide treatments. The outstanding treatment was PPG-844 at 1.0 lb/A; 98% of the field sandbur was controlled. PPG-844 at 0.5 lb/A provided 89% control, which ranked with the better treatments in the study. Herbicide combinations of acetochlor + butylate or EPTC, and alachlor + butylate or EPTC provided excellent control considering the relatively low rates of each herbicide in the treatments. Hence, the materials appeared additive in herbicidal activity.

Visual evaluations were made of the vigor of field sandbur seedlings on June 25, 1981. Neither acetochlor nor alachlor, when applied alone at the rates used in this study, greatly affected vigor. The addition of cyanazine, and to a lesser extent, atrazine, reduced the vigor of uncontrolled field sandbur. The addition of butylate or EPTC to acetochlor or alachlor resulted in marked reduction of seedling vigor. All treatments with butylate, vernolate, EPTC and PPG-844 reduced vigor of field sandbur to levels where it was not competitive with corn.

Control of field sandbur was visually evaluated on Sept. 2, 1981. As on June 25, PPG-844 at 1.0 lb/A was the superior treatment in the study, giving 98% control. PPG-844 at 0.5 lb/A gave 95% control. Other excellent treatments included butylate + atrazine at 3.0 + 1.0 lb/A and EPTC + atrazine at 3.0 + 1.0 lb/A. The effectiveness of all treatments, with the exception of those where atrazine was included or the PPG-844 treatments, declined from June 25 to Sept. 2. The persistence of most herbicides was inadequate to maintain control of field sandbur throughout the growing season. (Wyo. Agric. Exp. Sta., Laramie, WY 82071, SR 1118)

Control of field sandbur in sprinkler-irrigated corn with preplant incorporated herbicides

Herbicides[1]	Rate lb/A	Field Sandbur Percent Control[2] June 25	Sept. 2	Vigor[3] 0-10
acetochlor	2.0	52	10	9
acetochlor	3.0	52	10	10
acetochlor + atrazine	2.0 + 1.0	64	30	5
acetochlor + cyanazine	2.0 + 1.25	50	15	6
acetochlor + butylate[4]	2.0 + 2.0	80	45	2
acetochlor + ETPC[4]	2.0 + 2.0	82	20	2
alachlor	3.0	59	10	9
alachlor	4.0	51	5	8
alachlor + atrazine	3.0 + 1.0	75	35	4
alachlor + cyanazine	3.0 + 1.25	70	15	7
alachlor + butylate[4]	2.0 + 2.0	92	40	3
alachlor + EPTC[4]	2.0 + 2.0	83	45	2
butylate[4]	4.0	87	65	2
butylate[4] + atrazine	3.0 + 1.0	89	90	1
vernolate[4]	4.0	71	15	3
vernolate[4] + atrazine	3.0 + 1.0	80	55	2
EPTC[4]	4.0	81	65	2
EPTC[4] + R-33865	4.0	86	75	1
ETPC[4] + atrazine	3.0 + 1.0	89	85	1
EPTC[4] + cyanazine	3.0 + 1.25	95	55	1
PPG-844	0.5	89	95	2
PPG-844	1.0	98	98	2
Check (no treatment)	---	0	0	10
plants/sq ft		*70*		

[1]Herbicides applied and incorporated May 15, 1981.
[2]Field sandbur control: plant counts on June 25 and visual evaluations on Sept. 2, 1981.
[3]Field sandbur vigor: visual evaluations on June 25, 1981. Rating system: 0 = dead plant; 10 = no injury.
[4]R-25788 antidote included.

Weed control in corn with preplant incorporated herbicides. Mitich, L.W. and N.L. Smith. A study was established on the Davis experimental farm to evaluate crop tolerance and weed response to individual and herbicide combinations in field corn (cultivar:NC+59). Herbicides were applied to preformed 30 inch beds with a CO_2 backpack sprayer calibrated to deliver 30 gpa spray volume on June 8, 1981. Four replications were employed utilizing a 10 ft. (4 rows) by 25 ft. plot size. A 10 inch band down the bed top was immediately incorporated with a Marvin Rowmaster power driven bed shaper. Soil is classified as loam with 1.2% organic matter. Corn was planted June 9 at a depth of 1.5 inches. The trial was furrow irrigated June 10 and as required throughout the duration of the experiment. A uniform stand of barnyardgrass, black nightshade, redroot pigweed, common purslane and milk thistle emerged along with the corn.

Visual evaluation for phytotoxicity and weed response were made July 6. Barnyardgrass, pigweed and nightshade were effectively controlled with alachlor, metolachlor, EPTC, MON 097, butylate 6 lb ai/A and alachlor or metolachlor combined with cyanazine.

R-40244 and atrazine appeared weak on barnyardgrass. SC 7829 and SC 8149 gave excellent nightshade control but were weak on barnyardgrass and pigweed. Depth of incorporation (2 vs. 3 inches) was not a factor in the efficacy of butylate. No conclusion on the efficacy of a safener (R-29148) combined with R-40244 could be noted since no phytotoxicity was observed from any treatment. (University of California Cooperative Extension, Davis, CA 95616).

Preplant incorporated herbicides for weed control in corn
Evaluated July 6, 1981

Herbicide	ai/A	Incorp. depth	Corn phyto	Barnyard-grass	Pigweed	Night-shade	Milk thistle	Purslane
alachlor	3.0	2"	0	9.7	10.0	10.0	10.0	10.0
metolachlor	2.0	2"	0.3	9.9	10.0	9.8	9.8	10.0
metolachlor	3.0	2"	0	9.9	10.0	9.5	9.0	10.0
EPTC + R-25788	4.0	3"	0	10.0	9.5	10.0	10.0	10.0
butylate + R-25788	4.0	3"	0	8.4	7.3	10.0	10.0	9.8
atrazine	1.0	2"	0	6.8	10.0	10.0	9.8	10.0
SC 7829	2.0	2"	0	5.0	3.5	10.0	8.8	10.0
SC 7829	3.0	2"	0	7.1	6.3	10.0	9.0	10.0
SC 7829	4.0	2"	0	7.5	7.2	9.3	10.0	10.0
SC 8149	2.0	2"	0	6.0	6.8	9.3	6.3	8.3
SC 8149	3.0	2"	0	7.0	5.5	10.0	10.0	10.0
SC 8149	4.0	2"	0	7.4	5.8	10.0	5.3	8.5
R-40244	0.25	2"	0	1.8	3.5	6.5	10.0	10.0
R-40244	0.5	2"	0	3.0	9.8	7.5	7.5	10.0
R-40244	1.0	2"	0	6.0	10.0	10.0	9.5	10.0
R-40244 + R-29148	0.25 + 0.25	2"	0	1.5	6.5	4.5	7.5	10.0
R-40244 + R-29148	0.25 + 0.5	2"	0	2.0	5.0	7.5	5.5	7.8
R-40244 + R-29148	0.5 + 0.5	2"	0	3.8	10.0	9.8	10.0	10.0
R-40244 + R-29148	0.5 + 1.0	2"	0	2.5	6.0	7.3	5.0	10.0
R-40244 + R-29148	1.0 + 1.0	2"	0	4.5	10.0	10.0	10.0	10.0
butylate + R-33865	3.0	2"	0.3	7.4	8.0	8.0	10.0	5.3
butylate + R-33865	4.0	2"	0	8.5	4.0	10.0	4.5	4.8
butylate + R-33865	6.0	2"	0	9.9	9.9	10.0	10.0	10.0
butylate + R-33865	3.0	3"	0	7.5	7.3	10.0	10.0	9.5
butylate + R-33865	6.0	3"	0	9.5	10.0	10.0	10.0	10.0
MON 097	1.5	2"	0	9.9	10.0	10.0	8.0	10.0
MON 097	3.0	2"	0	9.9	10.0	10.0	7.5	10.0
cyanazine	3.0	2"	0	8.4	9.5	10.0	9.8	10.0
cyanazine + alachlor	2 + 2	2"	0	9.9	10.0	10.0	7.3	7.5
cyanazine + metolachlor	2 + 2	2"	0	10.0	10.0	10.0	10.0	10.0
control	-	-	0	0.3	0.8	2.5	5.0	3.0
control	-	-	0	1.5	1.5	5.0	6.3	3.8

Average of 4 reps   0 = no control or injury   10 = complete control

Cotton yields from preplant fluridone treatments. Anderson, W. Powell and Gary Hoxworth. Fluridone has been the most promising herbicide tested over the years at this location for selective weed control in cotton. Dosages of .25 to 1.0 lb/A soil incorporated preplant have provided essentially 100 percent control of grass and broadleaved weeds with no apparent cotton injury (other than some foliar chlorosis of early leaves at the higher dosages).

Fluridone did persist in the soil in herbicidal amounts into the next crop year following application of .5 lb/A or greater and into the third crop year at .75 lb/A or greater. This soil persistence would not be a problem where cotton follows cotton in a cropping sequence, unless the crop was lost during the growing season and it was desired to replant with a different crop (apparently, few crop species are tolerant to fluridone). In fact, indications are that seedling weeds are controlled in the second and third crop years following a single treatment of fluridone in the first year at .5 and .75 lb/A, respectively. Where susceptible crops would ordinarily rotate with cotton in a sequential pattern, it may be necessary to follow cotton with cotton for a year or two until fluridone residues in the soil are gone. Such a practice would not be impractical and much benefit could result from the control of problem weed species. Fluridone has been such an effective herbicide that allowances for its soil persistence would appear justified.

At this location, .25 lb/A of fluridone soil incorporated preplant provided essentially 100 percent control of seedling grass and broadleaved weeds while .33 to .5 lb/A effectively controlled established perennial weeds such as johnsongrass and yellow nutsedge. Cotton yield data from fluridone treatments in 1980 indicated that yields were not adversely affected (1981 Res. Prog. Rpt., Western Soc. Weed Sci. pp 207-208).

In 1981, cotton yield data were obtained from plots treated with fluridone soil incorporated preplant January 30, 1981; cotton (var. Acala 1517-75) planted April 22 and the first furrow-irrigation made June 15. Fluridone was applied at .25, .33, .5, and .75 lb/A; a tank-mix of trifluralin (.75 lb/A) plus prometryn (1.6 lb/A) applied at the same time as fluridone served as a treated check. There were no untreated or hoed checks. Individual plots were 13.3 ft by 35 ft in size (encompassing four rows of cotton 27 ft long). Each treatment was replicated five times and the experimental design was a 5 x 5 Latin Square. Single, untreated plant-beds, running the length of the experimental area, separated replications and served to show the degree of weed infestation that would have occurred without weed control. Except for watering, two applications of Dipel for insect control, and fertilizing with ammonia, the experimental area received no further attention until the crop was harvested. Essentially 100 percent control of grass and broadleaved weeds was obtained with all fluridone treatments; a comparatively light infestation of weeds was present in the treated check by mid-season, and these weeds competed with the cotton for the remainder of the season. In October, the cotton was harvested by hand-picking twice the center two rows of each plot; a summary of the yield data is presented in the accompanying table. (Agr. Expt. Sta., New Mexico State University, Las Cruces, N.M. 88003.)

Cotton yields from plots treated with fluridone applied preplant January 30, 1981.

Fluridone lb/A	Yield[a] seed-cotton lb/plot	cotton-lint bales/A	Percent[b] yield difference
0.25	19.2	3.07	---
0.33	18.9	3.02	-1.4
0.50	19.8	3.16	+ 3
0.75	19.6	3.13	+ 2
Treated control[c]	14.8	2.37	-22.8

[a]Average of 5 replications; cotton hand-picked twice and yields totaled.

[b]Percent yield difference based on average yield from 0.25 lb/A fluridone treatment.

[c]Treated control was a tank-mix of trifluralin (.75 lb/A) plus prometryn (1.6 lb/A) applied preplant, soil incorporated, at same time fluridone was applied.

Evaluation of experimental herbicides for preplant control of yellow nutsedge (cyperus esculentus L.) in cotton. Bell, C. E. and D. W. Cudney. Several experimental herbicides were evaluated for yellow nutsedge in cotton when preplant incorporated and applied to the surface after planting (preemergence). Herbicides studied were NC20484, MBR20457, Acifluorfen (sodium 5[2-chloro-4-trifluoromethyl)-phenoxy]-2-nitrobenzoate), MC10108, and diethatyl (N-Chloroacetyl-N-(2,6-diethylphenyl)-glycine ethyl ester). Application was with a CO_2 pressurized plot sprayer at 30 gallons per acre (GPA). Plot size was 1 bed by 20 feet replicated 4 times in a randomized complete block design. Mechanical incorporation was accomplished with a PTO driven power tiller with straight knives to a depth of 1 1/2 to 2 inches.

No treatment gave commercially acceptable control of nutsedge, although NC20484 did give some suppression. The following table gives the treatments and results.

	Treatments	Rate (lb ai/A)	Application	% Nutsedge control
1.	NC20484	0.5	preplant incorporated	42.5
2.	NC20484	1.0	preplant incorporated	67.5
3.	MBR20457	1.0	preplant incorporated	27.5
4.	Acifluorfen	1.0	preplant incorporated	27.5
5.	MC10108	1.0	preplant incorporated	22.5
6.	Diethatyl + NC20484	2.0 + 0.5	preplant incorporated	62.5
7.	NC20484	0.5	preemergence	42.5
8.	NC20484	1.0	preemergence	50.0
9.	MBR20457	1.0	preemergence	32.5
10.	Acifluorfen	1.0	preemergence	32.5
11.	MC10108	1.0	preemergence	30.0
12.	Untreated control			0.0

Yields from cotton treated with over-the-top sprays of glyphosate. Anderson, W. Powell and Gary Hoxworth. In 1980, glyphosate was applied in over-the-top sprays to cotton in August; subsequent yields indicated that herbicidal dosages of glyphosate could be applied in this manner without yield reduction (1981 Res. Prog. Rpt., Western Soc. Weed Sci., p 209).

In 1981, glyphosate was applied at dosages of 1.0, 1.5, and 2.0 lb/A in over-the-top sprays to cotton; treatments were applied to their respective plots on July 15, August 3, and August 21. The growth regulator PIX was applied to certain plots at .044 lb/A on July 6. All treatments were applied in the equivalent of 34 gal/A of water, using a 3-gal shoulder-carried sprayer and a single TeeJet 8006 nozzle held directly over the center of the row of cotton -- spray pressure was 30 psi. Individual plots consisted of two adjacent rows of cotton 27 ft long, separated from adjacent plots by one untreated row of cotton. Each treatment was replicated 4 times and treatments were randomized within replications. To avoid weed/crop competition, the entire experimental area was pretreated with the herbicide fluridone preplant, soil incorporated, at .33 lb/A on April 1. Cotton (var. Acala 1517-75) was planted April 22. The cotton was harvested October 28, using a spindle-type machine. Cotton yield data resulting from this experiment are given in the table below.

Cotton yields following over-the-top sprays of glyphosate.

	Yield[a]		
glyphosate lb/A	seed-cotton lb/plot	cotton-lint bales/A	percent reduction
Glyphosate applied July 15			
1.0	15.1	2.7	16
1.5	11.1	2.0	36
2.0	7.2	1.3	59
Glyphosate applied August 3			
1.0	17.0	3.0	6
1.5	13.4	2.4	25
1.5 + PIX[b]	13.4	2.4	25
2.0	10.2	1.8	44
Glyphosate applied August 21			
1.0	18.0	3.2	0
1.5	16.9	2.8	13
1.5 + PIX[b]	16.0	2.8	13
2.0	14.9	2.6	19
PIX applied July 6			
0.84	15.6	2.8	13
Control (not treated with glyphosate or PIX)			
0	18.1	3.2	--

[a]Average of 4 replications; percent reduction in yield based on the average yield from the control.

[b]PIX applied July 6 at .044 lb ai/A.

(Agr. Expt. Sta., New Mexico State University, Las Cruces, N.M. 88003.)

Response of established jojoba to herbicides. Hamilton, K. C. and Peggy Specht. The cost of handweeding and cultivation of young jojoba was $200.00 to $300.00 per acre in Arizona in 1980. A test was conducted in 1981 at Casa Grande, AZ to determine the effects of herbicides on 1-year old, direct-seeded, furrow-irrigated jojoba. On March 25 herbicides were applied as directed sprays to the soil before an irrigation. Sorghum was planted with the jojoba in 1980 and was the main weed in 1981. The soil was very rough with much organic matter on the surface when herbicides were applied. Plots were 1 row (7 by 38 feet) and treatments were replicated four times.

No treatment gave complete control of sorghum (see table). Combinations of pendimethalin with diuron and simazine gave 70 to 90% control prior to hand weeding in June. All treatments containing diuron caused some chlorosis of jojoba. Treatments with 2 lb/A of diuron caused excessive chlorosis. Diuron alone at 2 lb/A reduced jojoba stands 60%. The most promising treatments in this test were combinations of pendimethalin and simazine. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Response of established jojoba to soil-applied herbicides.

	Weed control	Total plants		Chlorosis %	
Herbicide lb/A-Herbicide lb/A	5/21	3/25	7/22	5/21	7/22
Untreated	30	96	94	0	0
diuron 1	65	75	63	1	2
diuron 2	50	59	23	2	45
simazine 1	45	64	59	0	0
simazine 2	60	105	84	0	0
oryzalin 3	70	60	52	0	0
pendimethalin 3	70	116	104	0	0
trifluralin 3	65	82	89	0	0
trifluralin 2 - diuron 1	60	91	85	2	4
trifluralin 2 - simazine 1	75	74	68	0	0
pendimethalin 2 - diuron 1	70	98	98	3	5
pendimethalin 2 - diuron - 2	90	86	78	1	18
pendimethalin 2 - simazine 1	85	81	90	0	0
pendimethalin 2 - simazine 2	70	65	57	0	0
oryzalin 2 - diuron 1	80	98	93	1	2
oryzalin 2 - simazine 1	65	73	79	0	0

Response of seedling jojoba to herbicide combinations. Hamilton, K. C. and Peggy Specht. A test was conducted at Stanfield, AZ to determine the effects of herbicides applied preemergence in direct-seeded, furrow-irrigated jojoba. On April 9, 1981, diuron or simazine at 1 lb/A in combination with pendimethalin or trifluralin at 1 or 2 lb/A were applied to the soil before germination irrigations. Plots were 1 row (7 by 50 feet) and treatments were replicated four times. Weeds present were tumble pigweed, horse purslane, wright groundcherry, woolly morningglory, and puncturevine.

Combinations of diuron or simazine with pendimethalin or trifluralin did not affect emergence of jojoba. Herbicide combinations gave good initial control of annual weeds (see table). No herbicide treatment caused chlorosis of jojoba foliage. In July the test was hoed to remove weeds. Jojoba stands on the untreated plots were reduced more than 50% by hoeing. In September, jojoba plants on the hoed plots were shorter than plants treated with herbicides. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Response of weeds and seedling jojoba to soil-applied herbicide combinations.

Treatments - preemergence	Weed control %		Plants per plot	Chlorosis %	
Herbicide - lb/A - Herbicide - lb/A	5/21	6/2	7/15	6/2	7/15
Hoed	0	0	20	0	0
diuron - 1 trifluralin - 1	92	70	43	0	0
diuron - 1 pendimethalin - 1	92	80	46	0	0
diuron - 1 trifluralin - 2	92	65	58	0	0
diuron - 1 pendimethalin - 2	92	88	43	0	0
simazine - 1 trifluralin - 1	99	80	48	0	0
simazine - 1 pendimethalin - 1	95	80	53	0	0
simazine - 1 trifluralin - 2	96	80	54	0	0
simazine - 1 pendimethalin - 2	98	90	59	0	0

Field bindweed control in lentil. Lish, J. M., D. C. Thill, and R. H. Callihan. Herbicide treatments were applied to heavy barley stubble on September 10, 1980 at Tensed, Idaho. The soil temperature at 15 cm and air temperature was 19 and 25 C, respectively. The SULV 2,4-D was applied with a backpack sprayer equipped with a three nozzle boom calibrated to deliver 47 l/ha at 2.8 kg/cm^2 pressure from a CO_2 source. Other treatments were applied with a self-propelled tricycle sprayer equipped with a 4.6 m boom calibrated to deliver 187 l/ha at 2.8 kg/cm^2 pressure. Plot size was 4.6 x 6 m. The experimental design was a randomized complete block with four replications. Lentil was planted in the spring of 1981. Field bindweed control and lentil stand and vigor reduction were evaluated July 21.

All treatments except 2,4-D, dicamba at 1.12 kg/ha, and 2,4-D + dicamba at 3.36 + 1.12 kg/ha reduced field bindweed population over the check, however, no treatment effectively controlled field bindweed. Lentil stand and vigor were reduced with all treatments, however these differences were not statistically significant. (University of Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Field bindweed control in lentil

Treatment	Rate	Fibw	Lentil SR	Lentil VR
	(kg/ha)	--------(%)--------		
2,4-D amine (4S)	3.36	44	9	15
SULV 2,4-D (3.8 EC)	3.36	28	11	9
dicamba	1.12	44	25	22
dicamba	2.24	61	31	15
dicamba + 2,4-D amine	1.12 + 3.36	44	14	8
dicamba + SULV 2,4-D	1.12 + 3.36	48	5	6
dicamba + glyphosate	1.12 + 3.36	84	6	14
dicamba + glyphosate	0.57 + 1.57	72	2	1
glyphosate	3.36	82	4	10
dicamba + benazolin	0.57 + 0.28	67	4	6
dicamba + benazolin	1.12 + 0.28	69	24	4
check	-	0	0	0
$LSD_{0.05}$		48	NS	NS

Metribuzin tolerance and performance in lentils. Handly, J. V., R. H. Callihan, and D. C. Thill. The objectives of this study were to evaluate the tolerance of lentils (var. Chilean) to metribuzin, and the performance of metribuzin with various rates and application times. A backpack sprayer utilizing 5002 nozzles and calibrated to deliver 187 l/ha was used to apply all treatments. The study was arranged in a randomized complete block design with four replications and an individual plot size of 3 x 10 m. The soil is a silt loam with a C.E.C. of 15.7, pH of 6.6 and an organic matter of 1.9%. Incorporation was accomplished with a rototiller set 8 cm deep for preplant incorporated treatments and 2.5 cm for preemergence incorporated applications. Preplant incorporated treatments were made on June 1, 1981. The air temperature was 24 C, soil surface temperature 29 C, and at 12 cm the soil temperature was 21 C. The relative humidity was 36%. The crop was then seeded at a rate of 67 kg/ha approximately 7 cm deep. Preemergence incorporated treatments were made on June 2. Temperatures were as follows: air 16 C, soil surface 14 C, and 14 C at 12 cm below the soil surface. The relative humidity was 72%. Preemergence treatments were applied on June 2. Air temperature was 19 C, soil surface temperature was 16 C, soil temperature at 12 cm was 16 C and relative humidity was 62%. Early post applications were made on June 30. The air temperature was 21 C, soil temperature at 12 cm was 25 C and relative humidity was 48%. The crop had 6 to 7 nodes, mayweed had approximately 5 leaves, henbit had 8 leaves and the redroot pigweed had 3 leaves. Visual evaluations were made on July 16, 1981 to estimate crop injury and weed control. Yield data were not taken due to poor emergence caused by puddling and crusting of the soil surface due to thunderstorms that followed planting prior to emergence. Applications of metribuzin (dry flowable 75% a.i.) made preemergence incorporated caused no stand reduction that was significantly different from control plots whether alone or tank mixed with triallate (emulsifiable concentrate 480 g/l). Significant stand reductions did occur, however, with preplant incorporated treatments of metribuzin at .21, .28, 142 and .57 kg/ha all tank mixed with triallate at 1.4 kg/ha. Stand reductions also occurred at .28 kg/ha of metribuzin applied early post and at .57 or .42 kg/ha applied preemergence. Treatments of alachlor (emulsifiable concentrate 480 g/l) at 2.34 or 3.36 (kg/ha and oxyfluorfen (emulsifiable concentrate 240 g/l) at .42 or .57 kg/ha also caused significant stand reductions.

Chickweed was controlled well by incorporated treatments of metribuzin or metribuzin, triallate tank mixes with the exception of the .14 kg/ha rate preemergence incorporated. Inadequate control was observed with triallate alone, alachlor or oxyfluorfen. Mayweed was controlled well with metribuzin at rates of .28, .42 and .57 kg/ha with control being less and somewhat erratic at lower rates. These results are true for the control of pigweed as well, excellent control also being observed in plots treated with alachlor at 3.36 kg/ha and oxyfluorfen at .42 or .57 kg/ha. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Weed Control in Lentils at Moscow, Idaho 1981.

Treatment	Rate kg/ha	Application	Stand Reduction[2]	Percent Control[4]		
				Chickweed	Mayweed	Pigweed
Control	-	-	0 i[3]	0 d	0 e	0 e
triallate	1.4	PEI[1]	2 hi	17 d	12 e	10 de
triallate	1.4	PPI	23 f-i	25 cd	7 e	25 cde
metribuzin	.14	PEI	27 f-i	65 bcd	48 d	36 cde
metribuzin	.21	PEI	15 f-i	73 ab	65 bcd	62 abc
metribuzin	.28	PEI	5 hi	96 a	90 ab	95 ab
metribuzin	.42	PEI	31 e-i	100 a	98 a	97 ab
metribuzin	.57	PEI	13 ghi	100 a	100 a	100 a
metribuzin + triallate	.14 + 1.4	PEI	16 f-i	72 ab	81 abc	51 bcd
metribuzin + triallate	.21 + 1.4	PEI	17 f-i	75 ab	77 a-d	55 abc
metribuzin + triallate	.28 + 1.4	PEI	18 f-i	93 a	88 ab	97 ab
metribuzin + triallate	.42 + 1.4	PEI	28 f-i	100 a	97 a	100 a
metribuzin + triallate	.57 + 1.4	PEI	27 f-i	100 a	100 a	100 a
metribuzin + triallate	.14 + 1.4	PPI	25 f-i	88 a	52 cd	81 ab
metribuzin + triallate	.21 + 1.4	PPI	30 e-h	100 a	65 bcd	63 abc
metribuzin + triallate	.28 + 1.4	PPI	52 b-f	100 a	72 a-d	90 ab
metribuzin + triallate	.42 + 1.4	PPI	68 a-e	100 a	93 ab	97 ab
metribuzin + triallate	.57 + 1.4	PPI	88 ab	100 a	98 a	100 a
metribuzin	.57	PES	47 c-f	100 a	100 a	100 a
metribuzin	.42	PES	43 d-f	100 a	97 a	100 a
metribuzin	.14	E. POST	25 f-i	2 d	0 e	2 e
metribuzin	.21	E. POST	22 f-i	27 cd	0 e	25 cde
metribuzin	.28	E. POST	56 a-f	33 bcd	15 e	36 cde
alachlor	2.24	PPI	86 abc	0 d	7 e	67 abc
alachlor	3.36	PPI	95 a	60 abc	52 cd	100 a
oxyfluorfen	.42	PES	91 ab	10 d	46 d	88 ab
oxyfluorfen	.57	PES	76 a-d	12 d	77 abc	93 ab

1 PEI, incorporated after planting prior to emergence; PPI, preplant incorporated; PES, preemergence surface applied

2 0 = no stand reduction, 100 = complete kill

3 Means within a column followed by the same letter are not significantly different at the .05 level.

4 0 = no control, 100 = complete kill

Wild oat control in lentils. Handly, J. V., R. H. Callihan, and D. C. Thill. This study was established to evaluate selected herbicides for wild oat in lentils. All herbicides were applied with a backpack sprayer fitted with 5002 nozzles and calibrated to deliver 187 l/ha. The soil was a silt loam with a C.E.C. of 20, pH of 5.7 and an organic matter of 4%. Incorporation was done with a rototiller travelling 4 km/hr set 10 cm deep. Each plot was 3 by 10 meters and the study was arranged in a randomized complete block with 4 replications. Preplant incorporated treatments were applied on April 27, 1981. The air temperature was 17 C, soil surface temperature was 14 C and soil temperature at 10 cm was 10 C. The relative humidity was 52% percent. The crop was seeded on May 20 at 78 kg/ha. Post applications were made on June 12, 1981. The air temperature was 10 C and the soil surface temperature was 9 C. The relative humidity was 69% and a slight dew was present. The crop was 10 cm tall, the field pennycress was 17 cm tall and the wild oat had 4 true leaves. Visual evaluations were taken on July 13, 1981 for crop vigor and weed control. Yields were taken on August 25, 1981 with a Hege plot combine from an area of 12 square meters.

Excellent wild oat control was observed in plots treated with BAS 9052 (emulsifiable concentrated, 184 g/l) at .28 and .57 kg/ha, diclofop methyl (emulsifiable concentrated, 360 g/l) at 1.12 kg/ha, Ro 138895 (emulsifiable concentrate, 360 g/l) at .28 and .57 kg/ha, trifluralin (emulsifiable concentrate, 480 g/l) and triallate (emulsifiable concentrate, 480 g/l) at .84 plus 1.4 kg//ha respectively, and pendimethalin (emulsifiable concentrate, 480 g/l) at 1.68 kg/ha.

Lambsquarter was also controlled with pendimethalin at 1.12 kg/ha tank mixed with dinoseb (alkonolamine emulsifiable concentrate, 360 g/l) at 1.68 kg/ha, trifluralin (emulsifiable concentrate, 480 g/l) in a tank mix with triallate (emulsifiable concentrate, 480 g/l) at .84 and 1.4 kg/l, respectively. Pendimethalin alone at 1.12 or 1.68 kg/l applied either post or preplant incorporated gave adequate, but not complete control of lambs-quarter.

Difenzoquat (emulsifiable concentrated, 240 g a/l) failed to give adequate control of wild oat at either .84 or 1.12 kg/ha (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Weed control in lentils

Treatment	Rate kg/ha	Type of Application	VR[1]	Weed Control (%)[3] Wild Oat	Weed Control (%)[3] Lambsquarters	Yield kg/ha
Check	-	-	0 d[2]	0 d	0 f	1751 ab
difenzoquat	.84	Post	0 d	25 cd	0 f	1652 a-d
difenzoquat	1.12	Post	0 d	40 c	0 f	1602 a-e
pendimethalin + dinoseb	1.12 + 1.68	Post	28 a	0 d	83 ab	1401 de
BAS9052 + Mor-act 1%	.28	Post	0 d	90 a	0 f	1853 a
BAS9052 + Mor-act 1%	.57	Post	0 d	90 a	0 f	1786 abc
diclofop methyl	.84	Post	0 d	50 bc	0 f	1685 abc
diclofop methyl	1.12	Post	0 d	79 ab	3 f	1864 a
Ro 138895 +X77 1%	.28	Post	0 d	90 a	0 f	1800 a
Ro 138895 +X77 1%	.57	Post	0 d	94 a	3 f	1744 abc
trifluralin +triallate	.84 + 1.4	PPI	1 cd	100 a	96 a	1502 a-e
dinoseb	1.68	Post	18 b	0 d	23 ef	1609 a-e
pendimethalin	1.12	Post	15 b	5 d	49 cde	1465 cde
pendimethalin	1.68	Post	16 b	3 d	74 abc	1365 e
pendimethalin	1.12	PPI	0 d	36 c	45 de	1650 a-d
pendimethalin	1.68	PPI	5 c	81 a	65 bcd	1492 b-e

1/ crop vigor reduction. 0 = healthy vigorous plants, 100 = complete kill.

2/ Means within a column followed by the same letter not significantly different at the .05 level.

3/ 0 = no control, 100 = complete kill.

Postemergence application of bromoxynil by sprinkler irrigation system and plot sprayer for broadleaf weed control in oats. Humburg, N. E., H. P. Alley and R. E. Vore. Application of bromoxynil by a center-pivot sprinkler irrigation system that delivered 13,700 gpa was compared with application by a hand-carried sprayer that delivered 40 gpa of herbicide-water solution. Plots were located near Lusk, Wyoming on loamy sand soil (86.4% sand, 6.0% silt and 7.6% clay) of 1.7% organic matter and 6.9 pH. Herbicides were applied on June 13, 1981. A piston pump was used to inject bromoxynil into the sprinkler mainline at rates of 0.38 and 0.50 lb/A for application to 4.7 and 2.0 acre areas, respectively. Herbicides were broadcast-applied at the same rates with a plot sprayer; treatments were replicated three times on 1-sq rod plots arranged in randomized complete blocks.

Plant counts were made immediately after herbicide application on marked, subsample sites. Plant counts were made at the marked sites on July 21, 1981. Percent control values were based on the change in weed populations at specific sites within a given treatment area, not as a comparison with untreated check plots. The check value of -7% control for pigweed indicated germination of seed after June 13. Broadleaf weed control and oat yields were similar for center-pivot sprinkler and plot sprayer application methods. (Wyo. Agric. Exp. Sta., Laramie, WY 82071, SR 1136)

Postemergence application of bromoxynil by sprinkler irrigation system and plot sprayer for broadleaf weed control in oats

Application Method[1]	Rate	Percent Control[2]			Oats[3]
Herbicide	lb/A	PW	WBW	LQ	bu/A
Sprinkler System					
bromoxynil	0.38	94	96	100	85
initial plants/sq ft		*12.85*	*0.65*	*0.05*	
bromoxynil	0.50	90	100	97	74
initial plants/sq ft		*22.72*	*0.05*	*0.82*	
Plot Sprayer					
bromoxynil	0.38	95	100	100	79
initial plants/sq ft		*7.8*	*0.1*	*0.1*	
bromoxynil	0.50	91	92	100	78
initial plants/sq ft		*11.9*	*0.5*	*0.2*	
Check (no treatment)	--	-7	0	--	72
initial plants/sq ft		*8.2*	*0.1*	*0.0*	

[1]Herbicides were applied June 13, 1981.
[2]Plant counts on June 13 are presented as *initial plants/sq ft*. Percent control was based on plant counts made July 21, 1981. Abbreviations: PW = redroot and prostrate pigweed; WBW = wild buckwheat; LQ = common lambsquarters.
[3]Harvest date: August 21, 1981.

Effects of herbicides on weed control in dry peas. Handly, J. V., R. H. Callihan, and D. C. Thill. The objectives of this study were to evaluate most effective treatments selected from previous studies for broadleaf weed control in peas (variety Alaska). All herbicides were broadcast with a backpack sprayer and handheld boom fitted with 5002 nozzles and calibrated to deliver 187 l/ha. The soil is a silt loam with a C.E.C. of 22, pH of 5.9, and an organic matter of 3.6%. Preplant treatments were applied on June 4, 1981. The air temperature was 14 C, soil temperature 16 C at 12 cm, and the relative humidity was 78%. Treatments were incorporated with a rototiller traveling 4 km/hr set 7 cm deep. The crop was seeded on June 6 at a rate of 170 kg/ha. Preemergence treatments were applied on June 10. The air temperature was 8 C, the soil temperature at 12 cm was 10 C and the relative humidity was 95%. Post emergence applications were made on June 30. The air temperature was 21 C, the soil temperature at 12 cm was 26 C and the relative humidity was 48%. The peas had 3 nodes, and the mayweed, and henbit were in the seedling stage. The study was arranged in a randomized complete block with 4 replications. The individual plot size was 3 by 10 m. Visual estimates of crop injury and weed control were made on July 30. Crop yield was taken from an area of 12 m with a Hege plot combine on August 20.

Dinoseb (emulsifiable concentrate 360 g/L) applied at 10.08 kg/ha resulted in excellent control of henbit, mayweed, and groundsel, but poor control of pigweed. Metribuzin (dry flowable 75% a.i.) applied at 0.42 kg/ha preemergence produced excellent control of all species evaluated. Control with the lower rate of 0.28 kg/ha resulted in excellent control of groundsel, and poor control of the other species. The preemergence applications were more effective than post applications of metribuzin which were observed to produce poor control of the weeds present at both rates used. Metribuzin at 0.42 kg/ha and tank mixed with triallate (emulsifiable concentrate 480 g a.i./L) at 1.4 kg/ha produced excellent weed control, but caused severe crop injury. Crop tolerance appears to be lowered if the metribuzin is incorporated either mechanically or by high rainfall.

Triallate at 1.4 kg/ha tank mixed with trifluralin at 0.84 kg/ha produced fair control of henbit, good control of pigweed, and poor control of mayweed and groundsel. Oxyfluorfen (emulsifiable concentrate 240 g a.i./L) applied preemergence at 0.42 or 0.57 kg/ha resulted in excellent control of all species, but caused vigor reductions of 26 and 45%, respectively, which were reflected by poor yields. Propachlor (flowable 480 g a.i./L) applied preemergence at 4.48 or 5.6 kg/ha produced no crop injury, but poor control of all species evaluated. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Weed Control in Peas

Treatment	Rate kg/ha	Type of Application[1]	SR[2]	VR[3]	Percent Control[4] Henbit	Mayweed	Pigweed	Groundsel	Yield kg/ha
Check	–	–	0c[5]	0c	0d	0c	0c	0d	689 ab
dinoseb	10.08	PES	0c	1c	95ab	100a	33bc	100a	756 ab
metribuzin	.28	PES	0c	0c	75b	78ab	64ab	95a	847 a
metribuzin	.42	PES	1c	3c	100ab	100a	91a	100a	579 bc
metribuzin	.14	POST	0c	0c	3d	0c	0c	0d	694 ab
metribuzin	.28	POST	0c	0c	28c	35bc	38bc	13cd	496 bcd
metribuzin + trial	.42 + 1.4	PPI	87a	47a	100ab	100a	70ab	100a	27 e
trifluralin + trial	.84 + 1.4	PPI	0c	0c	75b	43bc	80a	43bc	741 ab
oxyfluorfen	.42	PES	1c	26b	100a	100a	93a	99a	347 cd
oxyfluorfen	.57	PES	9b	45a	100a	100a	100a	100a	263 d
propachlor	4.48	PES	0c	0c	0d	45bc	13c	40bc	757 ab
propachlor	5.6	PES	0c	0c	0d	65ab	15c	63ab	655 ab

[1] PES, preemergence surface applied. PPI, preplant incorporated.

[2] Stand reduction. 0, no reduction. 100, complete kill.

[3] Vigor reduction. 0, no reduction. 100, complete kill.

[4] 0 = no control. 100 = complete kill.

[5] Means within a column followed by the same letter are not significantly different at the .05 level.

Herbicide performance in chickpeas. Handly, J. V., R. H. Callihan, and D. C. Thill. This study was established at Grangeville, Idaho, to evaluate the efficacy of several herbicides for use in chickpeas (Cicer arietinum). All herbicides were applied with a backpack sprayer and handheld boom equipped with 8004 nozzles and calibrated to deliver 375 l/ha. Incorporation of herbicides was accomplished with a rototiller traveling 3 km/hr set 10 cm deep. The study was arranged in a randomized complete block with 4 replications. Individual plot size was 1.4 by 6.5 meters. Preplant incorporated and preemergence surface treatments were made on April 30, 1981. Temperatures were as follows, air temperature 29 C, soil surface temperature 35 C, and 14 C at 12 cm below the soil surface. The relative humidity was 50 percent. The crop was seeded on April 30, 1981 at a rate of 112 kg/ha. Post applications were made on June 11, 1981. The air temperature was 17 C, soil surface temperature 27 C, and at 12 cm below the soil surface the temperature was 16 C. The relative humidity was 82 percent. The crop had approximately 10 nodes, the henbit had 8 true leaves, the field pennycress had 10 true leaves, the mayweed was 4 cm tall, and the wild buckwheat had 3 true leaves. The study was evaluated on June 23, 1981 for crop tolerance and weed control. Harvest was accomplished on September 1, 1981 with a Hege plot combine. The harvested area was 5.6 square meters.

Excellent broadleaf control was obtained in plots treated with dinoseb (emulsifiable concentrate, 360 g/l) at 10.08 kg/ha or 10.08 followed by 2.24 kg/ha, metribuzin (flowable, 480 g/l) and triallate (emulsifiable concentrate, 480 g/l) at .42 plus 1.4 kg/ha, respectively, oxyfluorfen (emulsifiable concentrate, 240 g/l) at .57 kg/ha, and metribuzin at .42 kg/ha. Although weak on other broadleaf weeds propachlor (flowable, 480 a/l) at 4.5 kg/ha provided excellent control of mayweed which was a predominant weed at this location. Excellent control of henbit and wild buckwheat was seen in plots treated with profluralin (emulsifiable concentrate, 490 g/l) at 1.12 kg/ha, and trifluralin (emulsifiable concentrate, 480 g/l) plus triallate at 1.12 plus 1.14 kg/ha, respectively. Metribuzin at .14 kg/ha was effective in controlling only henbit.

Excellent grass control was observed in plots treated with BAS 9052 (emulsifiable concentrate, 184 g/l) at .57 kg/ha, Ro 138895 (emulsifiable concentrate, 360 g/l) at .57 kg/ha and fusilade (emulsifiable concentrate, 480 a/l) at 1.12 kg/ha.

Significant crop vigor reductions were observed in plots treated with dinoseb at 10.08 kg/ha followed by 2.24 kg/ha, metribuzin at .14 kg/ha, and oxyfluorfen at .57 kg/ha. These vigor reductions did not affect final yield and highest yields were seen in plots treated with oxyfluorfen and dinoseb (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide performance in chickpeas.

Treatment	Rate kg/ha	Type of[2] Application	Vigor[3] Reduction	% Control[1] Mayweed	Field Pennycress	Henbit	Wild Buckwheat	Grasses	Chickpeas Yield kg/ha
check	-	-	0 c[4]	0 c	0 c	0 c	0 c	0 c	1482 b
dinoseb	10.08	PES	8 c	95 a	90 a	69 ab	44 bc	0 c	2886 a
dinoseb/dinoseb	10.08/2.24	PES/POST	31 a	98 a	100 a	79 ab	97 a	35 bc	2114 ab
metribuzin + triallate	.42 + 1.4	PPI	0 c	91 a	100 a	75 ab	25 bc	50 ab	2628 a
metribuzin	.42	PPI	0 c	86 a	100 a	99 a	25 bc	0 c	1333 b
metribuzin	.14	POST	19 b	33 b	60 b	100 a	52 ab	25 bc	1333 b
diclofop methyl	1.12	POST	0 c	0 c	0 c	0 c	0 c	26 bc	983 b
BAS 9052 + Mor-act	.57	POST	0 c	0 c	0 c	2 c	25 bc	95 a	1333 b
RO 138895 + X77	.57	POST	0 c	0 c	0 c	0 c	10 bc	92 a	1004 b
propachlor	4.5	PES	3 c	93 a	17 c	46 b	25 bc	0 c	1998 ab
trifluralin + triallate	1.12 + 1.4	PPI	0 c	23 bc	0 c	75 ab	100 a	50 ab	1113 b
oxyfluorfen	.57	PES	33 a	100 a	100 a	100 a	100 a	60 ab	2789 a
profluralin	1.12	PPI	0 c	18 c	22 c	100 a	100 a	30 bc	1388 b
fusilade	1.12	POST	1 c	3 c	5 c	0 c	0 c	86 a	1189 b

[1] 0 = no control, 100 = complete kill

[2] PES - preemergence surface applied
PPI - preplant incorporated

[3] 0 = healthy, vigorous plants. 100 = complete kill

[4] Means within a column followed by the same letter are not significantly different at the 0.05 level according to Duncan's multiple range test.

Tolerance of chickpeas to herbicides. Handly, J. V., R. H. Callihan, and D. C. Thill. The purpose of this field study was to evaluate the tolerance of chickpeas (*Cicer arietinum* L.) to selected herbicides in northern Idaho. All herbicides were broadcast with a backpack sprayer and hand-held boom fitted with 5002 nozzles calibrated to deliver 187 l/ha. The soil is a silt loam with a C.E.C. of 22, pH of 5.3 and an organic matter of 4.6%. Preplant incorporated treatments were applied on April 27, 1981. The air temperature was 20 C, soil surface temperature was 25 C, and the soil temperature at 12 cm was 15 C. Incorporation was accomplished with a rototiller traveling 4 km/h and set 10 cm deep. The crop was seeded on May 3, 1981 at a rate of 112 kg/ha. Preemergence surface treatments were made on May 11, 1981. The air temperature was 8 C, soil surface temperature was 7 C, and soil temperature at 12 cm was 7 C. Postemergence applications were made on June 11, 1981. The crop had approximately 9 nodes and was 14 cm tall. The henbit had four true leaves and the grassy weeds; primarily volunteer wheat and some wild oat, had one tiller. The temperatures were as follows, air 12 C, soil surface 17 C, and 10 C at 12 cm below the soil surface. The study was arranged in a randomized complete block with four replications. Individual plot size was 3 x 10 m. Visual evaluations for crop vigor reduction and weed control were made on June 22, 1981. A Hege plot combine was used on September 9, 1981 to harvest an area of 12 square m from each plot.

Application of dinoseb (emulsifiable concentrate 360 g/l) at 10.08 kg/ha or 10.08 kg/ha followed by 2.24 kg/ha produced excellent control of henbit. The split application appeared to cause some crop injury at evaluation, but produced the highest yield in the study. Excellent control of henbit was also observed in plots treated with metribuzin (dry flowable, 75% a.i.) and triallate (emulsifiable concentrate, 480 g/l) at .42 plus 1.4 kg/ha, respectively, metribuzin at .42 kg/ha, oxyfluorfen (emulsifiable concentrate, 240 g/l) at .57 kg/ha, and trifluralin (emulsifiable concentrate 480 g/l) and triallate at 1.12 plus 1.4 kg/ha, respectively. Oxyfluorfen did cause crop damage resulting in the second lowest yield.

Excellent grass control was observed in plots treated with BAS 9052 (emulsifiable concentrate, 184 g/l) at .57 kg/ha or Ro 138895 (emulsifiable concentrate, 360 g/l) at .57 kg/ha.

Inadequate weed control was observed in plots treated with metribuzin at .14 kg/ha, diclofop methyl (emulsifiable concentrate, 360 g/l) at 1.12 kg/ha, propachlor (flowable, 480 g/l) at 4.5 kg/ha, and profluralin (emulsifiable concentrate 480 g/l) at 1.12 kg/ha. Poor weed control with diclofop methyl was due to the presence of volunteer wheat upon which activity would not be expected. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Weed control in chickpeas, Moscow, Idaho 1981

Treatment	Rate kg/ha	Type of Application[1]	Vigor Reduction[2]	Percent Control Henbit	Percent Control Grass	Yield kg/ha
check	-	-	0 d[3]	0 d	0 c	1336
dinoseb	10.08	PES	0 d	93 a	0 c	1383
dinoseb/dinoseb	10.08/2.24	PES/POST	11 c	100 a	50 ab	1540
metribuzin + triallate	.42 + 1.4	PPI	8 c	100 a	33 bc	1276
metribuzin	.42	PPI	1 d	98 a	40 abc	1370
metribuzin	.14	Post	19 b	44 c	0 c	1320
diclofop methyl	1.12	Post	0 d	0 d	47 abc	1179
BAS 9052 + Mor-act	.57	Post	0 d	0 d	87 a	1217
RO 138895 + X77	.57	Post	0 d	4 d	95 a	1110
propachlor	4.5	PES	0 d	58 b	0 c	1350
trifluralin + triallate	1.12 + 1.4	PPI	0 d	85 a	32 bc	1315
oxyfluorfen	.57	PES	41 a	100 a	0 c	1194
profluralin	1.12	PPI	0 d	63 b	0 c	1220

[1] PES - preemergence surface applied; PPI - preplant incorporated

[2] 0-100. 0 equals a healthy, vigorous plant

[3] Means followed by the same letter are not significant at the 0.05 level by Duncan's multiple range test.

Volunteer barley and broadleaf weed control in Austrian winter peas. Handly, J. V., R. H. Callihan and D. C. Thill. This study was established at Moscow to evaluate herbicides for crop tolerance and weed control in Austrian winter peas (*Pisum sativum* L.). All herbicides were applied with a knapsack sprayer and hand held boom equipped with 8004 nozzles and calibrated to deliver 374 l/ha. The soil is a silt loam with 3 percent organic matter, cation exchange capacity of 22 meq/100g, and a pH of 5.7. Pre-plant incorporated treatments were applied on September 9, 1980 under clear skies. The air and soil temperature was 13C and 10C at 12cm respectively. Incorporation was accomplished with a spike tooth harrow traveling once over the plot. The winter peas (variety Melrose) were seeded on September 29, 1980 at a rate of 90 kg/ha. Dormant applications were made on January 29, 1981. Air temperature was 10C and soil temperature at 12 was 5C. Spring applications were applied on April 27, 1981 with a wind from the west at 8 km/hr. Air and soil surface temperatures were 13 and 14C respectively. Soil temperature at 12cm was 15C. Late spring applications were made on May 18, 1981. The air temperature was 15C, the soil surface temperature 16C, and soil temperature was 15C at 12cm. The plots were arranged in a randomized complete block design with 3 replications. Visual evaluations were made on June 8, 1981 and a plot area of 11.96 square meters was harvested with a Hege plot combine on August 8, 1981.

Results

The pre-plant incorporated treatments of metribuzin (flowable, 480g/l) plus triallate (emulsifiable concentrate, 480g/l) provided good broad spectrum weed control as did fall applied treatments of metribuzin alone, dinoseb, (alkanolamine, emulsifiable concentrate, 360g/l) or a split application of dinoseb. Spring-applied metribuzin did not control the weeds studied as well as the fall applied metribuzin. A tank mix of trifluralin (emulsifiable concentrate, 480g/l) plus triallate failed to provide adequate weed control on all species with the exception of pineappleweed. Alachlor (emulsifiable concentrate, 480g/l), triallate (granular, 10% a.i.), and pronamide (wettable powder, 50% a.i.) all failed to provide good broad spectrum weed control.

Volunteer barley in the study was controlled best with RO 138895 (emulsifiable concentrate 360g/l). Fall applied metribuzin at .57 kg/ha, both dinoseb treatments, and pronamide at 1.12 kg/ha were observed to have excellent control of the volunteer barley.

All plots within the study area were observed to have high yields which reflected good moisture and lack of herbicidal injury. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Volunteer barley and broadleaf weed control in Austrian winter peas.

Treatment	kg/ha	Application	VR[1]	Percent Control[3/] Pineappleweed	Shepherdspurse	Volunteer Barley	Field Pennycress	Pea Yield kg/ha
Control	--	--	0	0	0	0	0	4570c
trifluralin + triallate	.57 1.4	PPI	0c[2/]	86b	40bcd	0d	33abc	5049bc
dinoseb	10	Dormant	3abc	100a	100a	98a	100a	5044bc
dinoseb/dinoseb	6.7 2.24	Dormant Spring	6ab	100a	100a	98a	100a	5339abc
metribuzin	.28	Spring	1bc	33bc	66ab	0d	66abc	5374abc
metribuzin	.42	Spring	0c	50abc	66ab	0d	33abc	5324abc
metribuzin	.57	Dormant	8a	100a	100a	91a	100a	5084abc
metribuzin	.42	Dormant	3abc	100a	100a	75ab	100a	5420abc
metribuzin + triallate	.57 + 1.4	PPI	1bc	96a	100a	30cd	100a	5157abc
diclofop-methyl	1.12	Spring	0c	23bc	26bcd	0d	3bc	5113abc
Ro 138895 + X77	.28	Spring	0c	26bc	36bcd	63abc	50abc	5467abc
Ro 138895 + X77	.57	Spring	0c	0c	0d	100a	33abc	5361abc
BAS 9052 + Mor-act	.28	Spring	0c	40abc	0d	23cd	6bc	5542ab
BAS 9052 + Mor-act	.42	Spring	1bc	30bc	6cd	61abc	66abc	5450abc
BAS 9052 + Mor-act	.57	Late spring	0c	33bc	10bcd	40bcd	48abc	6030a
alachlor	2.28	PPI	0c	6c	33bcd	0d	46abc	5625ab
alachlor	3.36	PPI	0c	3c	16bcd	10d	70abc	5280abc
triallate (granular)	1.68	PPI	0c	60abc	0d	0d	66abc	5228abc
pronamide	.57	Dormant	0c	23bc	16bcd	65abc	66abc	5092abc
pronamide	1.12	Dormant	0c	26bc	60abc	95a	83ab	5289abc

1/ Crop vigor reduction as compared to control plots, 0 equals healthy vigorous plants.
2/ Means within a column followed by the same letter are not significantly different at the 0.05 level.
3/ 0 = no control, 100 = complete kill

Weed control in Austrian winter peas. Handly, J. V., R. H. Callihan, and D. C. Thill. The objective of this study was to evaluate use of herbicides for weed control and crop tolerance in Austrian winter peas (*Pisum sativum* L.) (var. Melrose). All herbicides were broadcast with a knapsack sprayer and handheld boom equipped with 8004 nozzles, and calibrated to deliver 375 l/ha. Pre-plant incorporated treatments were applied on September 30, 1980 and incorporated once with a spike tooth harrow. The crop was immediately seeded 5 cm deep at a rate of 90 kg/ha. Immediately following this, preemergence treatments were applied. The air temperature was 20 C, the soil temperature was 17 C at 13 cm below the soil surface and the relative humidity was 68 percent. The skies were partly cloudy and the wind was from the north at 8 km/hr. Early post-emergence applications were made on April 29, 1981 under partly cloudy skies, with a west wind of 4 km/hr. The air temperature was 23 C and the soil temperature at 12 cm was 13 C with a relative humidity of 74 percent. Wild oat plants were in the three leaf stage and the crop had five nodes. Post-emergence treatments were applied to dry plants on May 7, 1981 under overcast skies with a relative humidity of 58 percent. The air temperature was 16 C and the soil temperature at 12 cm was 10 C with winds from the East at 6 km/hr. Wild oat plants were in the 4 to 5 leaf stage and the crop had 9 nodes. The plots were 2.7 by 9 meters arranged in a randomized complete block design with three replications. Visual evaluations for crop vigor reduction and percent weed control were taken on June 11, 1981. An area of 5.5 square meters was harvested with a Hege plot combine on August 5, 1981.

Results:

Preplant incorporated treatments of trifluralin (emulsifiable concentrate, 480 g/l) plus triallate (emulsifiable concentrate, 480 g/l) tank mix, metribuzin (Flowable, 480 g/l) plus triallate tank mix, alachlor (emulsifiable concentrate 480 g/l) and triallate (granular 10 percent a.i.) failed to produce acceptable control of either wild oats or broadleaf weeds. This may have been due to inadequate incorporation.

Dinoseb (alkanolamine, emulsifiable concentrate, 360 g/l) at 10 kg/ha applied preemergent to the crop showed good control of mayweed and marginal control of field pennycress and corn buttercup. Metribuzin applied either preemergent or early post-emergence was observed resulting in excellent control of the broadleaf weeds although significant crop injury resulted from .42 or .57 kg/ha metribuzin applied early post and pre-emergent, respectively. This injury may have been due to extremely wet soil conditions which stressed plants and lowered tolerance.

Excellent control of wild oat was observed in plots treated with RO 138895 (emulsifiable concentrate 360 g/l) at .28 or .57 kg/ha and in plots treated with BAS 9052 (emulsifiable concentrate 184 g/l) at .42 or .57 kg/ha. Applications of 0.28 kg/ha difenzoquat (emulsifiable concentrate 240 g/l), dichlofop or BAS 9052 resulted in marginal wild oat control (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Herbicide Screening Trial In Winter Peas Grangeville, Idaho 1981

Treatment	Rate kg/ha	Time of Application	Crop vigor reduction[3]	Percent Control[1] Wild Oat	Mayweed	Field pennycress	Corn buttercup	Pea Yield[2]
trifluralin + triallate	.57 + 1.4	PPI[4]	12 bc	35 cd	0 d	0 c	0 d	103 ab
metribuzin + triallate	.57 + 1.4	PPI	7 c	32 cd	60 b	60 ab	33 bcd	89 abc
alachlor	2.28	PPI	13 bc	0 d	58 b	50 b	70 ab	37 bc
alachlor	3.36	PPI	22 abc	25 cd	20 cd	25 bc	50 a-d	42 bc
triallate (granular)	1.68	PPI	5 c	50 a-d	0 d	0 c	0 d	79 abc
dinoseb	10	PES	0 c	0 d	85 ab	65 ab	55 abc	99 abc
dinoseb/dinoseb	6.7/2.24	PES/E. Post	0 c	5 cd	100 a	100 a	90 a	132 a
metribuzin	.28	E. Post	17 bc	20 cd	100 a	100 a	50 a-d	48 bc
metribuzin	.42	E. Post	40 a	17 cd	100 a	100 a	63 ab	26 c
metribuzin	.42	PES	8 c	0 d	90 a	93 a	90 a	42 bc
metribuzin	.57	PES	30 ab	0 d	80 ab	100 a	100 a	39 bc
diclofop	1.12	E. Post	3 c	43 bcd	0 d	26 bc	0 d	91 abc
Ro 138895 + X77	.28	E. Post	3 c	97 a	0 d	0 c	0 d	80 abc
Ro 138895 + X77	.57	E. Post	5 c	95 ab	23 c	26 bc	3 cd	41 bc
Bas 9052 + Moract	.28	E. Post	7 c	63 abc	0 d	0 c	0 d	68 abc
Bas 9052 + Moract	.42	E. Post	7 c	93 ab	0 c	0 c	0 d	63 abc
Bas 9052 + Moract	.57	Post	3 c	93 ab	0 d	0 c	0 d	38 bc
difenzoquat	1.12	Post	3 c	40 cd	0 d	0 c	0 d	59 abc
difenzoquat	2.24	Post	8 c	30 cd	0 d	0 c	0 d	40 bc
Control	-	-	2 c	0 d	0 d	0 c	0 d	100 ab

1 100 = complete kill, 0 = no control
2 Expressed as percent of yield from control.
3 0 = healthy vigorous plants, 100 = dead plants
4 PPI = preplant incorporated
PES = preemergent surface applied

Control of weeds in winter rape. Handly, J. V., R. H. Callihan, and D. C. Thill. The purpose of this study was to screen selected herbicides for weed control and crop tolerance in winter rape. All herbicides were applied with a knapsack sprayer fitted with 8004 nozzles and calibrated to deliver 375 l/ha. The soil was a silt loam with a C.E.C. of 21, pH of 6.1, and an organic matter of 3%. The study was arranged in a randomized complete block with 4 replications and an individual plot size of 2.7 by 9.1 meters. Preplant incorporated treatments were applied on September 4, 1980. The air temperature was 24 C, the temperature at the soil surface was 22 C, and at 12 cm below the soil surface the temperature was 21 C. Incorporation was accomplished with a flextine harrow traveling 8 km/hr set 5 cm deep twice over. On September 14, 1980 the preemergence surface applied treatment was made. Early post applications were made on January 29, 1981. The air temperature was 9 C, the soil temperature was 4 C at 12 cm, and the relative humidity was 67%. The crop had 4 to 5 leaves. Early spring application were made on April 27, 1981. The air temperature was 18 C and the soil temperature at 12 cm was 15 C. The relative humidity was 54%. The crop was beginning to bolt, and the field pennycress was 20 cm tall. Spring applications were made on May 18, 1981. The air temperature was 15 C, the soil temperature at 12 cm was 15 C, and the relative humidity was 60%. The crop was 1.5 m tall and beginning to flower. The field pennycress was 30 cm tall. Visual estimates of weed control, crop vigor and crop stand reductions were made on June 9, 1981. An area of 10 square meters was harvested from each plot on August 18, 1981 with a Hege plot combine.

Dicamba (emulsifiable concentrate 480 g/l) at 1.12 or 2.24 kg/ha applied early postemergence caused stand and vigor reductions in the crop, but resulted in complete control of field pennycress and henbit. Dicamba applied at 1.12 or 2.24 kg/ha in the spring caused less crop injury than early post application, overall weed control was still excellent, but the lower rate of 1.12 kg/ha resulted in poor control of field pennycress. Both rates of dicamba applied early post or in the spring resulted in yields that were significantly less than other treatments in the study.

Napropamide (wettable powder 50% a.i.) alone at 1.12 kg/ha preemergence surface applied resulted in excellent control of field pennycress and chickweed. Split applications of trifluralin (emulsifiable concentrate 480 g/l) at 1.12 kg/ha or triallate (emulsifiable concentrate 480 g/l) at 1.4 kg/ha followed by napropamide at 1.12 kg/ha produced good overall weed control. A tank mix of triallate at 1.4 kg/ha and trifluralin at 1.12 kg/ha produced weed control comparable to trifluralin alone. Unacceptable control of field pennycress and chickweed was observed in plots treated with triallate (granular 10% a.i.) at 1.57 kg/ha, diclofop methyl (emulsifiable concentrate 480 g/l) at 1.12 kg/ha, ethalfluralin (emulsifiable concentrate 360 g/l at 1.12 kg/ha, profluralin (emulsifiable concentrate 480 g/l) at 1.12 kg/ha, or propham (flowable 480 g/l) at 3.36 kg/ha.

Yields were uniformly high for all treatments with the exception of dicamba; reflecting optimum growth conditions and lack of herbicidal injury in this study. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Weed Control in Winter Rape.

Treatment	Rate kg/ha	Application[1]	Crop SR[2]	Crop VR[3]	Percent Control[5] Fieldpennycress	Percent Control[5] Chickweed	Yield kg/ha
Check	--	--	0b[4]	0e	0c	0b	5383a
dicamba	1.12	E. Post	8b	18bc	100a	100a	2037c
dicamba	2.24	E. Post	35a	50a	100a	100a	1306cd
dicamba	1.12	Spring	0b	15bcd	63abc	100a	2020c
dicamba	2.24	Spring	0b	23b	90ab	100a	812d
trifluralin/napropamide	1.12/ 1.12	PPI/ E. Post	0b	0e	78ab	93a	5032ab
triallate/napropamide	1.4/ 1.12	PPI/ E. Post	0b	7cde	93ab	100a	5069ab
napropamide	1.12	PES	0b	2de	93ab	93a	4965ab
diclofop-methyl	1.12	Early Spring	0b	7cde	30bc	33ab	4606ab
diclofop-methyl	1.12	Spring	0b	10b-e	46abc	60ab	4579ab
trifluralin	1.12	PPI	0b	3de	33abc	67ab	4832ab
triallate (granular)	1.57	E. Post	0b	0e	0c	0b	4663ab
trifluralin + triallate	1.12 + 1.4	PPI	0b	12b-e	33abc	33ab	5545a
diclofop-methyl	1.12	PPI	0b	0e	0c	0b	4436ab
ethalfluralin	1.12	PPI	0b	0e	53abc	43ab	4511ab
profluralin	1.12	PPI	0b	0e	0c	33ab	4117b
propham	3.36	E. Post	0b	3de	43abc	43ab	4437ab

1/ PPI, preplant incorporated. PES, preemergence surface applied.

2/ Crop stand reduction. 0, no reduction; 100, complete kill.

3/ Crop vigor reduction. 0, no reduction; 100, complete kill.

4/ Means within a column followed by the same letter are not significantly different at the .05 level.

5/ 0, no control. 100, complete control.

Oxyfluorfen as a replacement for nitrofen for preemergence weed control in sugarbeets in the Imperial Valley of California. Bell, C. E. Nitrofen (2,4-dichlorophenyl p-nitrophenyl ether) was used extensively for preemergence weed control in sugarbeets in the Imperial Valley. With removal of nitrofen from the herbicide market, many growers were left without an acceptable preemergence herbicide for their use. Oxyfluorfen (2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl)benzene) was evaluated in a field study as a possible replacement since it has similar chemistry and activity of nitrofen. Oxyfluorfen was applied to the surface of the bed after planting at three rates; 0.5, 1.0 and 1.5 lb ai/A. Nitrofen was applied in a similar manner at 4 lb ai/A. Application was with a CO_2 pressurized plot sprayer at 34 gallons per acre (GPA) of water. Plot size was 2 beds by 25 feet with 4 replications in a randomized complete block design. The sugarbeets were germinated with furrow irrigation.

Results indicate good efficacy of oxyfluorfen, but a very low margin of safety. The following table outlines results. Further trials will investigate the use of oxyfluorfen at lower rates. (University of California Cooperative Extension, El Centro, CA. 92243).

Treatment	Rate (lb ai/A)	Nettleleaf goosefoot control %	Stand*
Oxyfluorfen	0.5	100	13.25
Oxyfluorfen	1.0	100	7.5
Oxyfluorfen	1.5	100	3.25
Nitrofen	4.0	82.5	19.75
Untreated Control		0	23.5

* Actual count of 4 ft. of bed times 2 beds, mean of 4 replications.

Response of sugarbeets to postemergence herbicides. Doty, C. H. and K. C. Hamilton. Selective, postemergence grass herbicides were evaluated in combination with phenmedipham for annual weed control in sugarbeets in 1980 at Mesa, Arizona. On September 11 one row per bed of Spreckles S-445-H sugarbeets were planted and irrigated by watering every furrow. The sugarbeets were blocked to an 8-inch spacing and the test was cultivated twice. Herbicides were applied as a tank mix on October 1 when sugarbeets had two-to-four true leaves, broadleaf weeds were 2 inches tall, and grass weeds were 5 inches tall. Weeds present were Wright groundcherry, red sprangletop, Palmer amaranth, and junglerice. Herbicides were applied in a 13-inch band over the sugarbeets in 40 gpa water. Plots were five 30-inch wide beds, 30 feet long, and treatments were replicated four times. Sugarbeets were harvested June 25, 1981.

The only treatment controlling Palmer amaranth was phenmedipham plus 1 lb/A RO-13-8895. Wright groundcherry was controlled by all herbicide treatments. Control of annual grass with experimental herbicides was good at 0.5 lb/A and excellent at 1 lb/A. Sugarbeets were stunted by the combinations of phenmedipham and RO-13-8895 and phenmedipham and Bas-90520H. Yield of sugarbeets may have been reduced by phenmedipham-RO-13-8895 combinations. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85040.)

Response of weeds and sugarbeets to postemergence herbicides

Treatment		Weed control percent estimated						Yield of roots
		Palmer amaranth		Wright groundcherry		annual grass		
Herbicide	lb/A	Oct.	Dec.	Oct.	Dec.	Oct.	Dec.	Tons/acre
phenmedipham/RO-13-8895[a/]	1/1.0	92	93	98	99	99	99	27
phenmedipham/RO-13-8895[a/]	1/0.5	62	62	96	100	79	95	27
phenmedipham/Bas-90520H[b/]	1/1.0	48	49	96	100	96	99	29
phenmedipham/Bas-90520H[b/]	1/0.5	23	47	95	100	86	97	30
phenmedipham/CGA-82725	1/1.0	25	38	95	99	98	100	31
phenmedipham/CGA-82725	1/0.5	25	31	95	100	81	95	32
phenmedipham	1	23	45	95	100	0	54	29

a/ X-77 adjuvant, 0.5%, added to spray mix.

b/ crop oil, 1.3%, added to spray mix.

Evaluation of sequential herbicide mixtures for selective weed control in sugarbeets. Schild, L. D. and E. E. Schweizer. New sequential preplant and postemergence herbicide treatments were compared for the selective control of kochia, redroot pigweed, and common lambsquarters in sugarbeets.

Weed seeds were applied at 12.9 lb/A on a 10-inch band and incorporated 1-1/2 inches deep on April 9. 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. Preplant treatments were applied broadcast in water at 40 gpa and incorporated in semi-moist soil with good tilth. Pelleted 'GW Mono-Hy D2' sugarbeet seed were planted at three seeds per foot of row. On April 14 1.3 inches of water was applied by overhead sprinklers to ensure germination. Postemergence herbicides were applied initially on May 15 at 50 gpa on a 7-inch band when sugarbeets had 4 true leaves. Stages of weed growth at the first postemergence application in the cycloate and untreated plots were: kochia seedlings had 10 leaves and were 2 to 3 inches in height; and redroot pigweed had 4 to 6 leaves, 1/2 to 1 inch in height. In the untreated plots common lambsquarters was 2 to 2-1/2 inches in height, with 6 to 8 leaves, whereas in the cycloate-treated plots the seedlings had only 4 to 6 leaves and were 1/2 to 1 inches tall. Stages of weed growth at the first postemergence application in ethofumesate and ethofumesate + cycloate plots were: kochia was 1/2 to 1 inch tall, in the rosette stage, with 8 to 10 leaves; redroot pigweed had 4 true leaves, 1/2 inch in height with plants prostrate; and common lambsquarters had 6 to 8 leaves, 1/2 to 1-1/4 inches in height. The second postemergence treatment was applied on May 22 when sugarbeets had 6 true leaves.

The response of sugarbeets and weeds to the herbicides was determined on June 9 by counting the number of weeds and sugarbeets present in two quadrats, each 4-1/2 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. Sugarbeet suppression was rated on June 5.

The stand of sugarbeets was reduced most (21-35%) when a mixture of Ro 13-8895 + ethofumesate + desmedipham was applied sequentially over the preplant treatments (see table). These reductions in stand were 12 to 29% greater than those observed in plots treated only with preplanting herbicides. The foliar growth of sugarbeets was suppressed 44% by the mixture of ethofumesate + cycloate applied preplant at 1.25 + 1.25 lb ai/A followed by an initial postemergence mixture of BAS 9052 + ethofumesate + desmedipham at 0.25 + 1 + 1 lb ai/A and a second postemergence mixture of ethofumesate + desmedipham at 1 + 1 lb ai/A 7 days later.

Preplant treatments did not control kochia satisfactorily (20-58%). The stand of common lambsquarters and redroot pigweed was reduced most, 96 and 98% respectively, by a mixture of ethofumesate + cycloate at 1.25 + 1.25 lb ai/A.

Sequential preplant + postemergence treatments controlled kochia 42 to 80% more than preplant treatments. Preplant treatments followed by two postemergence treatments controlled kochia 4 to 54% more than treatments followed with single postemergence applications. Seven sequential treatments controlled 99% or more of the total weed population.

Two postemergence applications controlled overall weeds 24 to 51% more than a single application. Two applications of BAS + ethofumesate + desmedipham or Ro 13-8895 + ethofumesate + desmedipham controlled 95 and 96%, respectively, of the total weed population.

No antagonism for broadleaf control was observed when BAS 9052 or Ro 13-8895 was tank mixed with ethofumesate + desmedipham. This screening test suggests that two postemergence applications of ethofumesate + desmedipham at 1 + 1 lb ai/A can control broadleaf weeds as effectively as a preplant treatment followed by a postemergence treatment. (Western Region, Agricultural Research Service, U.S. Department of Agriculture, Fort Collins, Colorado 80523).

Response of sugarbeets and weeds to sequential herbicide treatments (Fort Collins, Colorado)

Treatments[a]					Sugarbeets		Weed control (stand reduction)[b]			
Preplant herbicides	Rate	Postemergence herbicides	No. of applications	Rate	Stand reduction[b]	Visual rating[c]	KO[d]	LQ	RPW	Avg
	(lb ai/A)			(lb ai/A)	(%)					
Ethofumesate	2	Untreated	0	0	6	5	58	64	97	73
Ethofumesate	2	Des+Phen	1	0.5+0.5	7	13	90	96	100	95
Ethofumesate	2	Des+Phen	2	0.375+0.375	0	18	94	97	100	97
Ethofumesate	2	Etho+Des+Phen	1	1.5+0.375+0.375	19	24	82	97	100	93
Ethofumesate	2	Etho+Des+Phen	2	1+0.25+0.25	9	24	98	100	100	99
Ethofumesate	2	BAS+Etho+Des	1	0.25+1+1	6	16	80	100	100	93
Ethofumesate	2	BAS+Etho+Des	2[e]	0.25+1+1	21	36	99	100	100	99+
Ethofumesate	2	Ro+Etho+Des	1	0.375+1+1	35	29	84	99	100	94
Ethofumesate	2	Ro+Etho+Des	2[e]	0.375+1+1	10	29	100	100	100	100
Cycloate	3	Untreated	0	0	2	8	20	91	86	66
Cycloate	3	Des+Phen	1	0.5+0.5	9	14	43	97	90	77
Cycolate	3	Des+Phen	2	0.375+0.375	4	18	53	96	98	82
Cycolate	3	Etho+Des+Phen	1	1.5+0.375+0.375	7	23	53	100	99	84
Cycolate	3	Etho+Des+Phen	2	1+0.25+0.25	6	24	92	100	100	97
Cycolate	3	BAS+Etho+Des	1	0.25+1+1	7	21	42	100	100	81
Cycolate	3	BAS+Etho+Des	2[e]	0.25+1+1	12	38	92	100	100	97
Cycolate	3	Ro+Etho+Des	1	0.375+1+1	21	21	44	100	100	81
Cycolate	3	Ro+Etho+Des	2[e]	0.375+1+1	4	33	98	100	100	99
Etho+Cycolate	1.25+1.25	Untreated	0	0	9	13	48	96	98	81
Etho+Cycolate	1.25+1.25	Des+Phen	1	0.5+0.5	9	16	75	99	98	91
Etho+Cycolate	1.25+1.25	Des+Phen	2	0.375+0.375	5	21	83	98	100	94
Etho+Cycolate	1.25+1.25	Etho+Des+Phen	1	1.5+0.375+0.375	18	33	85	100	100	95
Etho+Cycolate	1.25+1.25	Etho+Des+Phen	2	1+0.25+0.25	8	33	98	100	100	99
Etho+Cycolate	1.25+1.25	BAS+Etho+Des	1	0.25+1+1	10	20	73	100	100	91
Etho+Cycolate	1.25+1.25	BAS+Etho+Des	2[e]	0.25+1+1	9	44	99	100	100	99+
Etho+Cycolate	1.25+1.25	Ro+Etho+Des	1	0.375+1+1	24	29	83	99	100	94
Etho+Cycolate	1.25+1.25	Ro+Etho+Des	2[e]	0.375+1+1	11	31	99+	100	100	99+

Response of sugarbeets and weeds to sequential herbicide treatments (Fort Collins, Colorado)[continued]

Treatments[a]					Sugarbeets		Weed control (stand reduction)[b]			
Preplant herbicides	Rate	Postemergence herbicides	No. of applications	Rate	Stand reduction[b]	Visual rating[c]	KO[d]	LQ	RPW	Avg
	(lb ai/A)			(lb ai/A)	(%)					
Untreated	0	Des+Phen	1	0.5+0.5	5	3	9	71	31	37
Untreated	0	Des+Phen	2	0.375+0.375	7	9	32	98	54	61
Untreated	0	Etho+Des+Phen	1	1.5+0.375+0.375	13	10	24	87	64	58
Untreated	0	Etho+Des+Phen	2	1+0.25+0.25	6	15	67	98	80	82
Untreated	0	BAS+Etho+Des	1	0.25+1+1	11	11	0	65	66	44
Untreated	0	BAS+Etho+Des	2[e]	0.25+1+1	9	24	87	100	99+	95
Untreated	0	Ro+Etho+Des	1	0.375+1+1	4	10	12	79	93	61
Untreated	0	Ro+Etho+Des	2[e]	0.375+1+1	1	19	89	100	98	96
Check-weeds/ft^2	-	-	-	-	-	-	5.9	2.7	5.6	4.7

[a]BAS = BAS 9052; Des = desmedipham; Etho = ethofumesate; Phen = phenmedipham; Ro = Ro 13-8895
[b]Plant counts taken June 9, 1981
[c]Visual ratings of 0 = no sugarbeet suppression and 100 = all plants killed
[d]KO = kochia; LQ = common lambsquarters; RPW = redroot pigweed
[e]BAS 9052 and Ro 13-8895 were not applied for the second a-plication

Control of mayweed, lambsquarter, and wild oat in sunflower. Handly, J. V., R. H. Callihan, and D. C. Thill. This study was established at Moscow, Idaho, to determine effective treatments for weed control in sunflower (var. 894). All herbicides were applied with a backpack sprayer and handheld boom equipped with 5002 nozzles and calibrated to deliver 187 l/ha. The study was arranged in a randomized complete block with 4 replications and individual plot size of 3 by 10 meters. The soil is a clay with a C.E.C. of 47, pH of 4.6 and an organic matter of 6.8%. Preplant incorporated treatments were applied on May 19, 1981. The air temperature was 11 C, soil surface temperature was 11 C and at 12 cm below the soil surface the temperature was 12 C. Relative humidity was 89%. Incorporation was done with a rototiller 8 cm deep. Crop seeding immediately followed at a rate of one seed every 23 cm approximately 6 cm deep. Preemergence treatments were applied on May 22, 1981. The air temperature was 14 C, soil surface temperature was 13 C and soil temperature at 12 cm was 13 C. The relative humidity was 84%. Post applications at the 3 to 4 leaf stage of crop growth were made on June 10, 1981. The air temperature was 14 C and the relative humidity was 81%. The wild oat had 2 to 4 leaves, the lambsquarter 2 true leaves, and the mayweed had not yet emerged. Applications in the 6 to 7 leaf stage of growth were made on June 24, 1981. The air temperature was 10 C and the relative humidity was 68%. The wild oat plants had 1 tiller, the lambsquarter 10 true leaves, and the mayweed was approximately 8 cm in diameter. Visual evaluations were made on June 29 for crop injury and weed control. The study was harvested with a Hege plot combine on September 11, 1981. The harvested area was 14 square meters.

Excellent control of wild oat was observed in plots treated with triallate (emulsifiable concentrate 480 g/l) at 1.4 kg/ha tank mixed with trifluralin (emulsifiable concentrate 480 g/l) or profluralin (emulsifiable concentrate 480 g/l) both at 1.12 kg/ha. Both treatments also gave 100% control of lambsquarter, but inadequate control of mayweed.

Chloramben (emulsifiable concentrate 240 g/l) at 3.36 kg/ha resulted in fair control of wild oat and mayweed, and excellent control of lambsquarter. Ro 138895 (emulsifiable concentrate 360 g/l) at .57 kg/ha alone or tank mixed with oxyfluorfen (emulsifiable concentrate 240 g/l) at .42 kg/ha produced excellent wild oat control. Mayweed and lambsquarter were not controlled with Ro 138895 alone and control was only slightly better when tank mixed with oxyfluorfen. These results are also true for BAS 9052 (emulsifiable concentrate 184 g/l) at .57 kg/ha alone or when tank mixed with oxyfluorfen at .42 kg/ha. Dichlofop methyl (emulsifiable concentrate 360 g/l) at 1.12 produced poor wild oat control. When diclofop at 1.12 kg/ha was tank mixed with oxyfluorfen at .42 kg/ha wild oat and mayweed control was good but lambsquarter control was poor.

SN 80786 (emulsifiable concentrate 480 g/l) at 1.69 or 3.36 kg/ha produced poor control of all the weed species in this study. Desmedipham (emulsifiable concentrate 160 g/l) at .84 or 1.12 kg/ha applied in the 3 to 4 leaf stage of crop growth showed good control of lambsquarter. When applied in the 6 to 7 leaf stage control was still high at the low rate but at 1.12 kg/ha lambsquarter control was inadequate. Applications made at either stage of leaf growth for both rates resulted in poor control of wild oat or mayweed.

Tank mixes of desmedipham and phenmedipham (emulsifiable concentrate 160 g/l) both at 0.84 kg/ha or 1.12 kg/ha produced excellent lambsquarter control but poor wild oat or mayweed control. All tank mixes of desmedipham and phenmedipham resulted in appreciable vigor reductions which were reflected in low yields. This may have been due to lack of tolerance in the sunflower resulting from cool wet conditions which hindered active growth and may have led to a thin cuticle.

Uniformly low yields throughout the study reflect the bird damage suffered as the sunflower plants reached maturity in the fall (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Weed Control in Sunflower

Treatment	Rate kg/ha	Application	Crop Vigor Reduction[1]	Percent Control			Yield % of check
				Wild Oat	Mayweed	Lambsquarter	
Check	-	-	0g[2]	0f	0e	0e	100ab
desmedipham	.84	3-4[3]	20def	0f	10cde	80ab	106 ab
desmedipham	1.12	3-4	39c	10def	28b-e	89a	100ab
desmedipham	.84	6-7	28cd	3f	18b-e	88a	116ab
desmedipham	1.12	6-7	24de	25d	18b-e	65abc	140ab
desmedipham + phenmedipham	.84 + .84	3-4	100a	15def	25b-e	95a	9c
desmedipham + phenmedipham	1.12 + 1.12	3-4	100a	22def	45a-d	100a	7c
desmedipham + phenmedipham	.84 + .84	6-7	40c	23de	39a-e	100a	84abc
desmedipham + phenmedipham	1.12 + 1.12	6-7	68b	23de	55ab	89a	71bc
SN80786	1.69	PES	0g	0f	12b-e	7de	124ab
SN80786	3.36	PES	0g	23de	40a-e	0e	138ab
trifluralin + triallate	1.12 + 1.4	PPI	0g	99a	27b-e	100a	140ab
profluralin + triallate	1.12 + 1.4	PPI	0g	95a	23b-e	100a	109ab
chloramben	3.36	PPI	4g	73bc	75a	100a	157a
Ro 138895 + X77	.57	3-4	3g	98a	2de	0e	70bc
BAS 9052 + Mor Act	.57	3-4	1g	94a	0e	0e	102ab
diclofop methyl	1.12	3-4	5g	64c	0e	10de	102ab
oxyfluorfen/Ro 138895 + X77	.42/.57	PES/3-4	13efg	97a	50abc	48bc	93ab
oxyfluorfen/BAS 9052 + Mor Act	.42/.57	PES/3-4	0g	93ab	38a-e	43cd	116ab
oxyfluorfen/diclofop methyl	.42/1.12	PES/3-4	6gf	80abc	80a	33cde	76abc

[1] Vigor reduction, 0 equals healthy vigorous plants.

[2] Means within a column followed by the same letter are not significantly different at the 0.05 level.

[3] Leaf stage of crop. PES-preemergence surface applied. PPI-preplant incorporated.

Wheat variety tolerance to difenzoquat treatment. Carlson, H. L., J. E. Hill, D. R. Colbert. A field study was established on the UC Davis campus to evaluate tolerance of eight wheat varieties to postemergence application of the wild oat herbicide difenzoquat. Wheat varieties were planted on December 15, 1979 in a replicated complete block split-plot design. Varieties were assigned to 1.3 by 7.6 m sub plots while difenzoquat treatments of 1.1 and 2.2 kg/ha and untreated controls were assigned to 7.6 by 12.2 m main plots. The plots were replicated five times. On March 4, 1980, difenzoquat treatments were applied with a CO_2 pressure backpack sprayer using 190 l/ha water carrier. At the time of application wheat plants had four to six tillers and were growing in water saturated soil. Approximately 12 hours elapsed between the time of application and subsequent rainfall. Due to heavy January and February rains most of the early wheat growth was under waterlogged conditions.

The plots were evaluated for difenzoquat injury symptoms 3 and 11 weeks after herbicide application (Table 1). All of the varieties showed some degree of injury symptoms three weeks after treatment. Injury symptoms were acute on four varieties; NK 775-1817, Pro Brand 611, W444 and D7316. Chlorotic leaves and reduced plant vigor were still apparent on these varieties 11 weeks after treatment. Stand evaluation was made on all plots. The stands of D7316 and W444 were markedly reduced relative to the other varieties. However, the stand reductions were attributed to the waterlogged soil conditions and not to the herbicide treatment. The plots were harvested for grain yield on June 10, 1980 (Table 2). The yields of D7316, W444, Pro Brand 611 and NK 775-1817 were reduced by difenzoquat treatment at 1.1 and 2.2 kg/ha. These are the same varieties that exhibited severe early injury symptoms. The grain test weights of W444 and D7316 were significantly reduced by the difenzoquat treatments. Bushel weights of other tested varieties were not affected by herbicide treatment. The yields of Anza, UC 353, UC 360 and Aldura were not affected by herbicide treatment. These varieties thus appear tolerant to difenzoquat even though some early injury symptoms were observed. (University of California Cooperative Extension, Davis 95616 and American Cyanimid Corporation)

Table 1. Difenzoquat injury evaluation on eight wheat varieties.[1]

	Difenzoquat[2]				Difenzoquat[3]			
	Untreated	1.0 lb/A	2.0 lb/A	Variety average	Untreated	1.0 lb/A	2.0 lb/A	Variety average
Anza	0.5	1.2	1.9	1.2	0.0	0.0	0.0	0.0
D7316	0.5	5.0	7.1	4.2	0.0	3.2	4.4	2.5
UC 353	0.4	1.6	2.3	1.4	0.0	0.0	0.3	0.1
UC 360	0.1	1.6	2.5	1.4	0.0	0.0	0.6	0.2
Aldura	0.4	1.6	2.3	1.4	0.0	0.0	0.2	0.1
W444	0.1	4.9	6.6	3.8	0.0	3.2	4.6	2.6
Pro Brand 611	0.6	3.3	5.1	3.0	0.0	1.5	3.4	1.6
NK 775-1817	0.2	3.2	5.1	2.8	0.0	1.6	3.8	1.8
Treatment Average	3.5	2.8	4.1		0.0	1.2	2.2	

[1]Visual ratings are the average of five replications based on 0-10 scale where 0 = no injury and 10 = all plants dead.

[2]LSD 5% rated March 27, 1980:

Between herbicide treatments	0.52
Between varieties	0.36
Between a given variety at different herbicide levels	0.63
Between different varieties at different herbicide levels	0.78

[3]LSD 5% rated May 28, 1980:

Between herbicide treatments	0.24
Between varieties	0.30
Between a given variety at different herbicide levels	0.53
Between different varieties at different herbicide levels	0.55

Table 2. Effect of difenzoquat treatment on the yields of eight wheat varieties.

	Untreated	Difenzoquat treated		Variety
		1.1 hg/ha	2.2 kg/ha	average
Anza	7225	7170	7725	7373
D7316	2741	2408	2060	2403
UC 353	7522	7769	7544	7612
UC 360	7109	7321	7053	7161
Aldura	6141	6433	6844	6473
W444	6371	4534	3533	4813
Pro Brand 611	6354	5633	5005	5664
NK 775-1817	6937	6265	4890	6031
Herbicide average	6300	5941	5581	
LSD 5%:				
Between herbicide treatments				544
Between varieties				542
Between given variety at different herbicide levels				938
Between different varieties at different herbicide levels				1030

Chlorsulfuron-metribuzin combination evaluation in spring wheat. PEABODY, D. V. A field experiment was established to evaluate six low rate combinations of chlorsulfuron with metribuzin and to compare these combinations with "standard" rates of these two herbicidies applied alone on yield of spring wheat and on annual weed control. All treatments were replicated four times on 1.7 by 10 feet plots in a randomized complete block design. The soil was a silt loam with 20% sand, 65% silt, 15% clay, 3.2% organic matter and a pH of 6.1. Spring wheat (cultivar, Twin) was planted April 16, 1981 in rows 5 inches apart with a Nordsten grain drill and the entire plot area was swathed and then thrashed on September 3, 1981 with a Vogel plot thrasher. The grain was dried, screened and the weight of wheat per plot was recorded for each plot. Early postemergent (EPOE) treatments were made May 11, 1981 when wheat was in the three leaf stage of growth and most annual weeds were 1 to 2 inches in height. Late postemergent treatments were made when wheat had five to six leaves and annual weeds were 2 to 3 inches in height. All herbicides were applied with a compressed air sprayer mounted on a Allis-Chalmers G·tractor in 45 gpa. Additional application information is given in the table.

Statistical analysis of the replicated data is given in the table. No treatment caused a significant reduction in wheat yield below the handweeded check, and all of the various postemergent chlorsulfuron-metribuzin combinations gave good to excellent broadleaf annual weed control to harvest.

Treatments, yield data[3] and control ratings[1,2,3]
in spring wheat field test

Herbicide	Appl time	Rate oz ai/A	Wheat yield gm/plt	Rating GWR	Rating PRKW	Rating PESW	Rating COGR	Rating PAWE	Rating SHPU	Rating COCW	Rating ITRY
weedy check			426b	2.0c	3.0bc	2.8b	4.5a	4.0a	4.5a	4.0b	4.0a
handweeded check			506ab	2.0c	2.3c	3.3b	4.6a	5.0a	5.0a	4.5ab	3.9a
dinoseb amine	LPOE	24	653a	3.5b	3.8a-c	5.0a	5.0a	5.0a	5.0a	5.0a	4.3a
metribuzin	EPOE	6	621ab	4.5ab	5.0a	4.9a	4.5a	4.9a	5.0a	5.0a	4.8a
chlorsulfuron	EPOE	0.5	602ab	4.6ab	4.5ab	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
chlorsulfuron metribuzin	EPOE EPOE	0.125 2	668a	4.4ab	4.3ab	5.0a	5.0a	5.0a	5.0a	5.0a	4.9a
chlorsulfuron metribuzin	EPOE EPOE	0.125 4	621ab	4.9a	4.8a	5.0a	4.6a	5.0a	5.0a	5.0a	4.9a
chlorsulfuron metribuzin	EPOE EPOE	0.125 6	6 ab	5.0a	5.0a	5.0a	4.9a	5.0a	5.0a	5.0a	5.0a
chlorsulfuron metribuzin	EPOE EPOE	0.25 2	532ab	3.6b	3.5a-c	5.0a	4.6a	5.0a	5.0a	5.0a	4.3a
chlorsulfuron metribuzin	EPOE EPOE	0.25 4	628ab	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a	5.0a
chlorsulfuron metribuzin	EPOE EPOE	0.25 6	548ab	4.5ab	5.0a	5.0a	4.3a	5.0a	5.0a	5.0a	4.5a
coefficient of variation (%)			22	18	24	17	14	12	6	9	16

1/ 1 = no control, 2 = poor control, 3 = fair control, 4 = commercially practical control, 5 - weed eradication. Ratings are an average of two separate observations of four replications.

2/ Weed designations: GWR = general or overall weed rating; PRKW - knotweed, prostrate; PESW = smartweed, Pennsylvania; COGR = groundsel, common; PAWE = pineappleweed; SHPU - shepherdspurse; COCW = chickweed, common; ITRY = Italian ryegrass.

3/ Means within a column followed by the same letter are not significantly different at the 5% level of probability as determined by Duncan's multiple range test.

The influence of postemergence herbicides on broadleaf weed control in spring wheat. Thill, D. C., W. J. Schumacher, R. H. Callihan, and B. G. Schaat. A study was conducted at Reubens, Idaho to evaluate the effect of postemergence herbicide application on broadleaf weeds in spring wheat (var. Idaed). Treatments were applied on June 23, 1981 using a CO_2 backpack sprayer calibrated to deliver 187 l/ha at 2.8 kg/cm^2 when the crop was in the 5 to 6 leaf stage of development with 1 to 2 tillers. Broadleaf weeds were in the 3 to 6 leaf stage of development. Air and soil temperatures at the time of application were 20 and 16.6 C at 15 cm, respectively. Relative humidity was 63% with a 10% cloud cover. The experimental design was a randomized complete block with four replications. Each plot measured 3 x 10 m in size. Visual evaluation of crop and weed stand and vigor reduction were made on July 17, 1981 and the study was harvested on September 15, 1981 using a small plot combine. Of the weed species present, mayweed populations ranged from 30 to 45 plants/m^2 throughout the entire plot area.

Of the 16 treatments tested, the tank mixtures of metribuzin + bromoxynil, the high rate of dicamba + metribuzin and SAN-315 resulted in best broad-spectrum broadleaf weed control (Table). The addition of bromoxynil to metribuzin increased the control of the broadleaf weeds compared to metribuzin alone with no accompanying adverse effect on the crop. The addition of metribuzin to dicamba also increased the control of the weeds when compared to dicamba alone.

All treatments yielded higher than the untreated check (although some were not significantly different) with the greatest yield obtained by using SAN-315 at 1.12 kg/ha or bifenox + MCPA at 0.56 + 0.56 kg/ha. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Broadleaf weed control in spring wheat.

Treatment	Rate	Crop SR[2]	Crop VR[3]	Field pennycress SR	Field pennycress VR	Mayweed SR	Mayweed VR	Henbit SR	Henbit VR	Yield
	(kg/ha)	(%)								(kg/ha)
check	-	0b[1]	0d	0c	0c	0f	0e	0c	0c	934c
dicamba	0.15	1ab	0d	100a	100a	40c-e	44c-e	58ab	59ab	1046a-c
metribuzin	0.15	3ab	4a-d	100a	100a	23d-f	29c-e	75a	75a	1067a-c
metribuzin	0.28	3ab	4a-d	100a	100a	70a-c	63a-c	100a	100a	1005a-c
dicamba + metribuzin	0.15+0.15	3ab	4a-d	100a	100a	50b-d	48b-d	75a	80a	1019a-c
dicamba + metribuzin	0.15+0.28	6ab	9ab	100a	100a	85ab	90a	100a	100a	1018a-c
metribuzin + bromoxynil	0.28+0.42	5ab	9ab	100a	100a	100a	100a	100a	100a	971bc
metribuzin + bromoxynil	0.14+0.42	3ab	3b-d	100a	100a	100a	100a	100a	100a	980a-c
metribuzin + bromoxynil	0.14+0.28	8a	8a-c	100a	100a	94a	95a	100a	100a	1065a-c
metribuzin + bromoxynil	0.28+0.28	4ab	10a	100a	100a	98a	98a	100a	100a	1115a-c
bifenox	0.56	0b	0d	33b	43b	0f	5e	25bc	30bc	1048a-c
bifenox + MCPA	0.56+0.56	0b	0d	67a	67b	5ef	15de	100a	100a	1191a
MCPA	0.56	0b	1cd	67a	67b	0f	0e	25bc	25bc	1025a-c
acifluorfen	0.42	3ab	4a-d	100a	100a	50b-d	63a-c	70a	78a	1045a-c
SAN-315	1.12	1ab	1cd	100a	100a	75a-c	84ab	90a	85a	1193a
SAN-315	2.24	5ab	10a	100a	100a	87ab	87ab	100a	100a	1185ab
bromoxynil	0.28	2ab	2cd	100a	100a	53b-d	49b-d	64ab	60ab	1074a-c

1 Means followed by the same letter(s) within a column are not significantly different at the .05 level of Duncan's multiple range test.
2 SR = % stand reduction
3 VR = % vigor reduction

Wild oat control in winter wheat. Alley, H. P., N. E. Humburg and G. L. Costel. The study was conducted near Sheridan, Wyoming, to evaluate early and late postemergence herbicide treatments for control of wild oat in dryland winter wheat. The early postemergence treatments were applied April 29 when the wild oat were 1.5 to 2 leaf stage-of-growth (majority 2-leaf) and the winter wheat had 10 to 12 inch leaf height. The late postemergence treatments were applied May 8 when the wild oat were in the 3 to 5 leaf stage. All treatments were applied with a 6-nozzle knapsack spray unit in 10 gpa water as carrier. The soil was classified as a silty clay loam (17.8% sand, 51.0% silt, 31.2% clay, 2.9% organic matter with a 7.7 pH).

Visual wild oat control evaluations were made on July 2 and 23 and plots harvested August 15.

The early postemergence treatments of dichlofop, barban + metribuzin and dichlofop + bromoxynil exceeded 90% wild oat control. The most effective late postemergence treatments of SD 45328 and difenzoquat + chlorsulfuron gave 81 to 88% wild oat control. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1117).

Wild oat control and winter wheat yields

Herbicides	Rate lb ai/A	Percent control	Yield Bu/A	Observations
Early Post				
dichlofop	0.75	96	42.1	No crop damage
dichlofop	1.0	93	42.4	" " "
dichlofop + bromoxynil	0.75 + 0.375	94	46.6	Minor yellowing
dichlofop + bromoxynil	1.0 + 0.375	96	42.6	" "
dichlofop + bromoxynil	1.0 + 0.5	81	43.6	" "
difenzoquat + 2,4-D ester	1.0 + 0.5	72	41.0	Moderate stunting - chlorotic
SD 45328	0.15	87	44.0	Small wild oat seeded
SD 45328	0.18	80	42.1	" " " "
SD 45328	0.25	58	42.0	" " " "
barban	0.25	20	43.9	" " " "
barban	0.38	55	51.9	" " " "
barban + metribuzin	0.25 + 0.125	89	39.1	
barban + metribuzin	0.25 + 0.25	93	39.8	
barban + chlorsulfuron	0.25 + 0.031	0	42.5	Wheat stunted
barban + chlorsulfuron	0.25 + 0.062	0	44.8	" "
barban + dichlofop	0.25 + 0.25	91	44.4	" "
barban + SD 45328	0.25 + 0.18	56	46.2	Small wild oat seeded
Late Post				
difenzoquat S	1.0	30	41.8	Wild oat stunted, headed
difenzoquat 2AS	1.0	69	46.6	Severe yellowing, stunting
difenzoquat 43DSP	1.0	71	46.5	Moderate to severe yellowing
difenzoquat 2ASU	1.0	30	43.7	Wild oat seeded
difenzoquat 2AS + chlorsulfuron	1.0 + 0.024	81	44.7	Severe yellowing and stunting
difenzoquat 43DSP + chlorsulfuron	1.0 + 0.024	85	49.1	Chlorotic wheat
SD 45328	0.15	80	48.3	Some yellowing lower leaves
SD 45328	0.18	82	45.7	" " " "
SD 45328	0.25	88	48.2	" " " "
SD 45328 + bromoxynil	0.18 + 0.375	73	51.2	
SD 45328 + chlorsulfuron	0.18 + 0.024	65	43.2	
Check	---	--	50.6	
wild oat/sq ft		*69*		

Diclofop for Downy bromegrass control in winter wheat. Dyer, W.E. and P.K. Fay. Downy brome (*Bromus tectorum*) is a troublesome weed for winter wheat producers in Montana. Metribuzin and trifluralin are presently cleared for use in Montana for control of downy bromegrass in winter wheat.

An experiment was conducted to determine the effect of incorporation of diclofop on downy brome control in winter wheat. 'Winalta' winter wheat was seeded August 29, 1979 in rows 15 cm apart. Diclofop was applied before seeding in 74.9 L water per ha with a CO_2 pressured backpack sprayer to 3 m by 9 m plots. There were 4 replications arranged in a split plot design. The experimental area was incorporated 0, 1, or 2 times with a fixed-tine harrow operating 5 cm deep.

Incorporation without herbicide application provided downy brome control. There were 16.9, 11.6, and 5.4 downy brome plants per 0.9 m^2 following 0, 1, and 2 incorporations, respectively. Incorporation alone increased yield from 77.7 to 90.3 bushels per acre. The downy brome seed population was hand applied at a rate of 3 bushels per acre just prior to herbicide application. Seeds were soil-incorporated with 2 field cultivations. The additional harrowing for herbicide incorporation buried seed to depths which impeded emergence.

Diclofop provided excellent control of downy brome at all rates tested. There was no significant increase in control when the herbicide was incorporated.

Effect of incorporation of diclofop on downy bromegrass control in winter wheat.

		6/2/80		6/18/80		10/10/80
Diclofop rate Kg/ha	No. of incorporations	Dobr plants per 0.9 m^2	Winter wheat plants per 30 cm	% Crop injury	% DoBr control	Crop Yield Bu/Acre
.75	2	1.4	6.9	2.5	88	96.0
1.00	2	.4	4.8	2.5	94	92.9
1.25	2	1.4	5.7	.0	86	94.4
2.00	2	.4	6.3	17.0	100	93.1
Control	2	5.4	5.9	.0	0	90.3
.75	1	3.9	6.7	.0	83	94.1
1.00	1	2.5	6.1	2.5	82	95.1
1.25	1	3.2	7.3	.0	89	94.7
2.00	1	.7	6.7	17.0	94	90.3
Control	1	11.6	5.7	.0	0	81.0
.75	0	5.7	6.7	.0	84	96.1
1.00	0	2.4	6.7	6.0	89	98.0
1.25	0	1.4	5.7	.0	92	98.5
2.00	0	.9	5.1	12.5	90	90.0
Control	0	16.9	7.0	.0	0	77.7
	CV	58.2	16.2	61.2	6.1	5.1
	LSD .05	4.8	2.1	5.2	9.3	10.0

Bulbous bluegrass control in winter wheat. Kambitsch, D. L., D. C. Thill, W. J. Schumacher and R. H. Callihan. A study was established at Grangeville, Idaho, to evaluate the efficacy of several wild oat and broadleaf herbicides on the control of bulbous bluegrass.

Preemergence surface (PES) treatments were applied on October 7, 1980. The relative humidity was 33%, and air and 15.2 cm deep soil temperatures were 29.4 and 16.6 C, respectively. Postemergence (Post) treatments were applied on April 21, 1981 when the crop was in the 4 leaf to 4 tiller stage of growth and the bulbous bluegrass was in the 3 leaf stage of growth. Relative humidity was 41%, and air and 15.2 cm deep soil temperatures were 6.6 and 7.2 C, respectively. All treatments were applied with a CO_2 pressurized, 3 nozzle knapsack sprayer calibrated to deliver 374 l/ha of spray solution at 2.8 kg/cm^2 pressure at a speed of 4.8 km/h. Individual plots were 2.8 x 9.1 m in size, and were arranged in a randomized complete block design with 3 replications. Visual evaluations were made on June 15, 1981, and plots were harvested for grain yield on September 14, 1981 with a small plot combine.

Plots treated with chlorosulfuron at 0.07 kg/ha and SSH-0860 at 1.68 kg/ha provided marginal bulbous bluegrass control compared to the untreated check (Table). Plots treated with metribuzin + bromoxynil at 0.42 + 0.42 kg/ha resulted in excellent control of corn buttercup and conical catchfly. SSH-0860 at 0.55 kg/ha and both rates of diclofop resulted in very poor control of all weed species.

The grain yield from all plots treated with herbicide was greater than that of the untreated check. However, chlorsulfuron at 0.07 kg/ha was the only herbicide treatment that had a significantly greater grain yield than the untreated check. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Bulbous Bluegrass Control in Winter Wheat.

Treatment	Rate	Method of Application[4]	Bulbous Bluegrass SR[2]	Bulbous Bluegrass VR[3]	Corn Buttercup SR	Corn Buttercup VR	Conical Catchfly SR	Conical Catchfly VR	Yield
	(kg/ha)		%						(kg/ha)
check	-	-	0e[1]	0c	0c	0b	0d	0c	2690b
SSH-0860	1.12	PES	23bc	20ab	50b	13b	13cd	17bc	2917b
SSH-0860	1.68	PES	70a	27a	53b	13b	7d	0c	3676ab
diclofop	1.12	PES	17bcd	3bc	0c	0b	0d	0c	2947b
diclofop	1.4	PES	20bc	7bc	0c	0b	0d	0c	3037ab
chlorsulfuron	0.035	PES	10cde	0c	53b	37ab	33c	10c	3175ab
chlorsulfuron	0.07	PES	63a	17abc	93a	70a	70b	17bc	3941a
metribuzin	0.42	POST	27b	7b	77ab	3b	70b	50ab	3212ab
metribuzin + bromoxynil	0.42 + 0.42	POST	30b	13abc	97a	70a	97a	80a	3641ab
SSH-0860	0.56	POST	3de	0c	40b	7b	0d	7c	3385ab

[1] Means within columns followed by the same letter(s) are not significantly different at the 0.05 level of probability according to Duncan's multiple range test.

[2] Visual estimate of percent stand reduction compared to the untreated check.

[3] Visual estimate of percent vigor reduction compared to the untreated check.

[4] PES = Preemergence surface application, Post = Postemergent application.

Weed control in minimum tillage winter wheat. Lish, J. M., D. C. Thill, and R. H. Callihan. Winter wheat was planted with a hoe-drill into lentil, spring wheat and winter wheat stubble at Worley, Idaho, in 1980. Herbicides were applied at the tillering stage of the wheat and the two to three leaf stage of wild oat with a backsprayer equipped with a six nozzle boom calibrated to deliver 187 l/ha at 2.8 kg/cm^2 pressure from a CO_2 source. Treatments were applied to 3 x 10 m plots on April 23, 1981. Wheat was topdressed with a urea-nitrogen solution at 33.6 kg/ha after herbicide application. Air temperature and soil temperature at 15 cm was 22 and 9 C, respectively. The experimental design was a randomized complete block with four replications.

Diclofop alone and in all combinations resulted in at least 90% control of wild oat in the spring wheat stubble (Table). Good wild oat control was obtained with diclofop combinations in lentil stubble except with chlorsulfuron + metribuzin + diclofop. Bluegrass was controlled with applications containing metribuzin or chlorsulfuron in both the lentil and spring wheat stubble. Wild oat and bluegrass were not controlled adequately in the winter wheat stubble. Metribuzin combinations gave some control of windgrass in the winter wheat stubble, however, the best control was 73% with chlorsulfuron + metribuzin. There were no broadleaf weeds present at time of evaluation.

Winter wheat stand establishment was very poor in the winter wheat stubble, therefore, visual stand and vigor reductions of the winter wheat were not evaluated. Metribuzin in combination with diclofop and bromoxynil reduced wheat stand 29 and 14% and vigor 25 and 20%, respectively, in the spring wheat stubble. Wheat stand was reduced 13% with both bromoxynil and bromoxynil + metribuzin in the lentil stubble. Grain yield did not differ between treatments. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Herbicide combinations on no-tillage winter wheat at Worley, Idaho, 1981.

Treatment	Rate	Type of Stubble: Winter Wheat WIOA	Winter Wheat Yield	Spring Wheat WIOA	Spring Wheat Yield	Lentil WIOA	Lentil Yield
	(kg/ha)	(%)	(kg/ha)	(%)	(kg/ha)	(%)	(kg/ha)
bromoxynil	0.42	36	1998	18	6311	5	3889
metribuzin	0.42	0	2694	69	6006	50	4608
diclofop	1.12	66	2374	99	6190	89	4767
chlorsulfuron	0.035	41	2043	71	5838	6	3424
bromoxynil + metribuzin	0.42 + 0.42	0	2421	43	6052	41	4267
bromoxynil + diclofop	0.42 + 1.12	48	2686	99	6240	90	4667
bromoxynil + metribuzin + diclofop	0.42 + 0.42 + 1.12	18	2107	93	6330	83	5999
chlorsulfuron + metribuzin	0.035 + 0.42	30	1940	66	432	64	4838
chlorsulfuron + diclofop	0.035 + 1.12	46	2230	96	6475	84	4457
chlorsulfuron + metribuzin + diclofop	0.035 + 0.42 + 1.12	73	1974	90	5150	85	5070
metribuzin + diclofop	0.42 + 1.12	39	1995	93	6260	67	4991
check		0	1422	0	5650	0	3895
LSD (0.05)		37	NS	24	NS	30	NS

Difenzoquat tolerance of ten wheat varieties. Mitich, L.W., N.L. Smith, J.E. Hill, and H.L. Carlson. Certain wheat varieties are susceptible to injury from postemergence applications of difenzoquat, a wild oat herbicide. Ten wheat varieties were selected and planted November 14, 1980 on the U.C. Davis experimental farm. A split plot design with 4 replications was used with herbicide treatments as main plots (25 by 50 ft.) and varieties being sub-plots (4 by 25 ft.). Difenzoquat (1 and 2 lb/A) was applied in 20 gpa water carrier utilizing a CO_2 backpack sprayer on February 12, 1981. A surfactant (X-77) was included at 0.25% v/v. Wheat was 6 to 10 in. tall with one to three tillers at the time of treatment.

Evaluation of crop phytotoxicity was made March 16, 1981. Aldura and NK 775 appeared extremely sensitive to difenzoquat, exhibiting stunting and reduced plant bigor. Difenzoquat at 2 lb/A produced slight injury to Yecora Rojo and Probred. The experiment was harvested for grain yield July 21, 1981. Yields from Aldura and NK 775 were severely reduced from the herbicide application. Yields from all other varieties tested were not significantly reduced from either rate of difenzoquat. (University of California Cooperative Extension, Davis, CA 95616).

Difenzoquat effect on wheat varieties

	Injury[1]			Yield (lb/A)[2]			
		Difenzoquat			Difenzoquat		Variety
Variety	Control	1 lb/A	2 lb/A	Control	1 lb/A	2 lb/A	average
Anza	0	0	0.2	5268	4835	5135	5080
Yecora Rojo	0	0.4	1.4	4510	4448	4186	4381
Probred	0.2	0.2	1.6	4261	4869	4166	4432
UC 313	0	0.2	0	3116	3034	3370	3173
Yolo	0	0.2	0.4	4619	4493	4931	4681
UC 355	0	0	0.2	4715	4605	4658	4659
UC 360	0	0	0.4	4539	4586	4663	4596
Aldura	0	5.8	7.0	5350	3126	1052	3176
NK 775	0	3.4	5.2	4855	3681	2610	3715
Oslo	0	0.2	0.4	4939	5006	4669	4871
Herbicide Average				4617	4268	3944	

1 Average of 5 reps. 0 = no injury 10 = all dead

2 LSD 5%:

Between herbicide treatments	338
Between varieties	381
Between given variety at different herbicide levels	661
Between different varieties at different herbicide levels	711

Annual grass and broadleaf weed control in winter wheat. Mitich, L.W., N.L. Smith and L.D. Clement. A site in Solano County heavily infested with wild oats (3 leaf), Italian ryegrass (2 to 3 leaf), yellowstar thistle (seedling to 4 in. rosette), wild mustard (4 in. ht.), and coast fiddleneck (2 to 8 in. dia.) was selected to evaluate candidate herbicides for their control. The area had been planted to wheat (cultivar Anza) which was in the 3 to 4 leaf stage when herbicides were applied March 2, 1981. Four replications were used, plot size being 10 by 20 ft. A surfactant (X-77 @ 0.25% v/v) was included in all treatments except 2,4-D amine and bromoxynil. A CO_2 sprayer calibrated at 20 gpa was used for the application. Weather was foggy, temperature of 45°F., with some dew on the foliage.

Evaluations of crop and weed response were made April 8. Crop phytotoxicity was observed from all treatments except 2,4-D, bromoxynil and DPX 4189. Good wild oat control was achieved with SD 45328 and difenzoquat, however control was reduced by approximately 20% when difenzoquat was tank mixed with 2,4-D or DPX 4189. Bromoxynil, 2,4-D, DPX 4189 and PPG 844 gave good control of the broadleaf species present in this experiment. (University of California Cooperative Extension, Davis and Fairfield, CA 95616).

Weed control in winter wheat

			Control[1]		
Herbicide	Ai/A	Wheat[1] phytotoxicity	Wild oats	Rye-grass	Broadleaf
2,4-D amine	0.75 lb.	0	0.5	0	7.8
bromoxynil	0.5 lb.	0	0.5	0	9.5
2,4-D + difenzoquat	0.75 + 1.0	4.8	7.8	0.3	8.0
DPX 4189	0.063 oz.	0	0	0	7.0
DPX 4189	0.125 oz.	0	0.3	0	7.8
DPX 4189	0.25 oz.	0	0.5	0	9.0
DPX 4189	0.5 oz.	0	1.3	1.0	8.5
DPX 4189 + difenzoquat	0.125 oz. + 1.0	6.0	7.3	0.5	8.8
DPX 3189 + difenzoquat	0.25 oz. + 1.0	6.5	8.0	0	9.3
PPG 844	0.1 lb.	3.5	0	0	8.5
PPG 844	0.3	3.8	1.0	0	8.3
PPG 844	0.6	4.0	2.3	1.0	8.5
SD 45328	0.15 lb.	2.0	7.5	1.5	1.0
SD 45328	0.2	2.5	8.0	3.0	0
SD 45328	0.25	3.8	8.5	3.0	1.0
SD 45328	0.5	3.8	10.0	3.3	0.3
difenzoquat	1.0	6.5	9.5	0	0.5
control	-	0	0.3	0	0.3
LSD 5%		2.1	3.7	N.S.	3.0

[1]Average of 4 replications.
0 = no control or phytotoxicity
10 = complete control
Evaluated April 8, 1981

Preemergence control of Italian ryegrass in winter wheat. Mitich, L.W. and N.L. Smith. Italian ryegrass is a serious competitor to wheat in many areas of California. Five soil applied herbicides were evaluated at the experimental farm on the Davis campus to evaluate their performance on this troublesome weed. Wheat (cultivar Anza) was drilled at a depth of 2 to 2.5 inches on November 11 to an area that had been pre-seeded to Italian ryegrass. Pendimethalin, oryzalin and napropamide were surface applied, and profluralin and trifluralin treatments were hand raked to simulate incorporation with a spiketooth harrow. Herbicides were applied November 11 utilizing a CO_2 backpack sprayer calibrated to deliver 30 gpa. Three replications were made; plot size was 11 by 25 ft. Soil type was Yolo fine sandy loam. The plot area received a total of 160 units of nitrogen, half of which was applied preplant. No rainfall had been recorded prior to a sprinkler irrigation (1.5 inches) on November 26, 1980.

Visual evaluations and ryegrass counts were recorded February 12, 1981. Napropamide (2 and 4 lb. ai/A) and trifluralin exhibited the best control of ryegrass. Pendimethalin, oryzalin and profluralin gave some degree of ryegrass control. Henbit was very tolerant of napropamide and very sensitive to pendimethalin. No crop injury was noted. Plots were harvested July 20. Wheat yields from all herbicide treatments were greater than the control but were substantially less than expected because a ryegrass population as low as 2 plants/sq. ft. can drastically reduce wheat yields. (University of California Cooperative Extension, Davis, CA 95616).

Preemergence control of ryegrass on anza wheat

Herbicide	Rate (lb/A)	% Weed control[1] 2/12/81			Plant counts 2/12/81		Yield (lb/A)
		Ryegrass	Henbit	Broadleaf	Ryegrass per ft[2]	% Control	
pendimethalin	0.75	4.3	10.0	5.7	14.6 B	58	2111 CDE
pendimethalin	1.0	5.3	10.0	7.3	8.6 BCD	73	2394 BCDE
pendimethalin	1.5	6.0	10.0	8.7	10.6 BC	69	2258 BCDE
oryzalin	0.5	8.0	5.7	6.7	8.0 CDE	77	2974 B
oryzalin	0.75	8.3	7.7	7.0	6.2 CDE	82	2814 BC
napropamide	1.0	5.7	1.0	6.3	10.6 BC	69	1987 DE
napropamide	2.0	8.5	0	6.7	3.8 DE	89	2577 BCD
napropamide	4.0	9.3	0.3	8.3	2.0 E	94	3693 A
profluralin	0.5	6.8	4.3	7.0	6.4 CDE	82	2624 BCD
profluralin	0.75	8.3	3.7	6.0	6.2 CDE	82	2369 BCDE
trifluralin	0.5	7.8	9.0	7.0	4.6 CDE	87	2912 BC
trifluralin	0.75	9.0	7.0	7.7	3.2 DE	91	2837 BC
control	0	0	0	0	34.6 A	0	1627 E

[1] 0 = No control; 10 = complete control.
Numbers followed by the same letter are not significant at the 5% level.

Evaluation of wild oat and broadleaf weed control in winter wheat. Morishita, D. W., D. C. Thill, W. J. Schumacher, and R. H. Callihan. Wild oat and broadleaf herbicides were applied at four stages of wild oat growth to evaluate weed control and effects on yield of winter wheat (var. Dawes).

The experiment was established April 21, 1981, near Cottonwood, Idaho. The experimental design was a randomized complete block with four replications. Each plot was 3 x 10 m in size. All herbicides were broadcast applied using a CO_2 pressurized knapsack sprayer calibrated to deliver 187.1 l/ha. Herbicides were applied at the 1 to 2, 2 to 3, and 4 leaf stage of wild oat on April 21, 29, and May 7, respectively. A final application was made May 26, at the two tiller stage of wild oat. Visual evaluations for weed control were made June 11. Yield data were obtained by harvesting a 12 m^2 area August 18, with a self-propelled plot combine.

Diclofop alone resulted in the best overall wild oat control. When diclofop was tank mixed with chlorsulfuron, at 0.035 kg/ha, the control of wild oat decreased. Tank mixes of chlorsulfuron + difenzoquat resulted in reduced wild oat control compared to the single application of difenzoquat. The same result was observed in the barban + metribuzin tank mix compared to barban as a single treatment. SAN-315, SAN-315 + diclofop, chlorsulfuron + diclofop at 0.035 + 1.12 and 0.018 + 1.12, and metribuzin at 0.28 kg/ha gave the best control of broadleaf weeds. The best overall control was observed in the chlorsulfuron + diclofop combinations and in the SAN-315 + diclofop tank mix.

None of the tested herbicides caused a reduction in crop stand or vigor, with the exception of SAN-315 + diclofop. However, yield data reveal no adverse effect from the early stand and vigor reduction. The highest yields from this study were in the chlorsulfuron + diclofop tank mixes. (University of Idaho Agricultural Experiment Station, Moscow, Idaho 83843)

Wild oat and broadleaf weed control and winter wheat tolerance to several herbicides.

Treatment	Rate	Date of application	Crop SR[1]	Crop VR[2]	Weed Control: field pennycress SR	field pennycress VR	corn gromwell SR	corn gromwell VR	wild oat SR	wild oat VR	henbit SR	henbit VR
	(kg/ha)		---(%)---									
check	-		0	0	0	0	0	0	0	0	0	0
chlorsulfuron + difenzoquat	0.035 + 1.12	5/7	0	3	59	83	100	100	18	45	40	58
chlorsulfuron + difenzoquat	0.018 + 1.12	5/7	0	0	75	88	93	85	23	45	45	58
chlorsulfuron + difenzoquat	0.009 + 1.12	5/7	0	0	45	65	100	100	18	45	23	55
chlorsulfuron + diclofop	0.035 + 1.12	4/29	0	1	98	95	99	88	70	63	75	83
chlorsulfuron + diclofop	0.018 + 1.12	4/29	0	0	100	100	100	100	78	73	74	83
chlorsulfuron + diclofop	0.009 + 1.12	4/29	0	0	93	93	100	100	77	53	55	70
chlorsulfuron	0.035	5/7	0	0	83	93	100	100	0		60	70
chlorsulfuron	0.018	5/7	0	0	63	68	100	100	0	2	38	55
chlorsufuron	0.009	5/7	0	0	53	68	100	100	0	0	30	60
SAN-315 + diclofop	1.12 + 0.56	4/29	5	10	100	100	100	100	0	0	30	94
SAN-315	1.12	4/29	0	0	100	100	100	100	4	4	82	87
barban + metribuzin	0.28 + 0.28	4/21	0	5	100	100	35	33	8	10	95	95
barban + metribuzin	0.28 + 0.14	4/21	0	3	68	63	60	53	8	15	80	75
barban + difenzoquat	0.28 + 0.56	5/7	0	0	0	0	0	0	37	50	0	0
barban + difenzoquat	0.28 + 0.28	5/7	0	0	0	0	0	0	40	53	0	0
barban	0.28	4/21	0	0	0	0	0	0	38	40	0	0
barban	0.35	4/21	0	3	0	0	0	0	50	33	0	0
difenzoquat	1.12	5/7	0	0	0	0	0	0	60	38	0	0
metribuzin	0.28	4/21	0	0	100	100	100	100	0	0	95	98
metribuzin	0.14	4/21	0	0	93	73	75	75	0	0	95	95
diclofop	1.12	4/29	0	0	0	0	0	0	90	68	0	0
difenzoquat + 2,4-D	1.12 + 0.84	4/29	0	0	95	80	60	55	20	40	8	25
difenzoquat + 2,4-D	1.12 + 0.84	5/26	0	11	0	20	0	15	20	43	0	15
$LSD_{0.05}$			2	5	18	21	22	30	16	19	18	18

[1] SR = stand reduction compared to the check

[2] VR = vigor reduction compared to the check

Wild oat and broadleaf weed control and winter wheat tolerance to several herbicides (cont.)

Treatment	Rate	Date of application	Weed Control: miners lettuce SR[1]	miners lettuce VR[2]	wild buckwheat SR	wild buckwheat VR	tansy mustard SR	tansy mustard VR	mayweed SR	mayweed VR	Yield
	(kg/ha)		---(%)---								(kg/ha)
check			0[1]	0	0	0	0	0	0	0	3635
chlorsulfuron + difenzoquat	0.035 + 1.12	5/7	100	100	100	100	100	100	100	100	4353
chlorsulfuron + difenzoquat	0.018 + 1.12	5/7	100	100	100	100	100	100	100	100	4144
chlorsulfuron + difenzoquat	0.009 + 1.12	5/7	98	98	100	100	100	100	95	90	4172
chlorsulfuron + diclofop	0.035 + 1.12	4/29	100	100	100	100	100	100	100	100	4621
chlorsulfuron + diclofop	0.018 + 1.12	4/29	100	100	100	100	100	100	100	100	4612
chlorsulfuron + diclofop	0.009 + 1.12	4/29	100	100	98	93	100	100	100	100	4582
chlorsulfuron	0.035	5/7	100	100	100	100	100	100	100	100	3760
chlorsulfuron	0.018	5/7	100	100	100	100	100	100	100	100	3874
chlorsulfuron	0.009	5/7	100	100	100	100	100	100	100	100	3834
SAN-315 + diclofop	1.12 + 0.56	4/29	100	100	78	80	100	100	100	100	4447
SAN-315	1.12	4/29	100	100	70	73	100	100	97	97	3733
barban + metribuzin	0.28 + 0.28	4/21	100	100	23	23	25	25	90	60	3835
barban + metribuzin	0.28 + 0.14	4/21	90	78	50	53	40	30	55	68	3732
barban + metribuzin	0.28 + 0.56	5/7	0	0	0	0	0	0	0	0	4174
barban + difenzoquat	0.28 + 0.28	5/7	0	0	0	0	0	0	0	0	4364
barban	0.28	4/21	0	0	0	0	0	0	0	0	4328
barban	0.35	4/21	0	0	0	0	0	0	0	0	4014
difenzoquat	1.12	5/7	0	0	0	0	0	0	0	0	4035
metribuzin	0.28	4/21	100	100	78	83	100	100	73	90	3801
metribuzin	0.14	4/21	100	100	28	28	50	28	55	53	3440
diclofop	1.12	4/29	0	0	0	0	0	0	0	0	4297
difenzoquat + 2,4-D	1.12 + 0.84	4/29	40	50	63	73	90	78	15	18	3793
difenzoquat + 2,4-D	1.12 + 0.84	5/26	0	15	0	23	2.5	10	0	10	4006
$LSD_{0.05}$			14	14	36	31	25	27	24	23	383

[1] SR = stand reduction compared to check.

[2] VR = vigor reduction compared to check.

Herbicides for downy bromegrass control in winter wheat. Rardon, P.L., V.R. Stewart and P.K. Fay. Downy bromegrass (*Bromus tectorum*) is becoming more troublesome in winter wheat in Montana. Diclofop, trifluralin, triallate, and metribuzin have shown promise for downy bromegrass control in the past. A uniform state-wide trial was initiated in the fall, 1980 to compare control with these 4 herbicides.

Winter wheat was seeded in early September, 1980 at 5 locations in Montana. The herbicides (except metribuzin) were applied before seeding with CO_2 pressured backpack sprayers to plots 2 m by 10 m and incorporated twice before seeding. Metribuzin was applied postemergence in the spring, 1981. There were 4 replications per location. Winter wheat injury and downy bromegrass control was evaluated by taking stand counts during the second or third week of April, 1981.

Downy bromegrass control ranged from 51% with metribuzin to 87% with the combination of trifluralin and triallate. Triallate alone provided an average of 83% control at 5 locations.

Trifluralin reduced the stand of winter wheat from 8.9 to approximately 7.5 plants per linear foot of row. None of the other herbicides tested reduced crop stand. Metribuzin produced visual symptoms of crop injury at several locations. Crop yield was increased an average of approximately 10 bushels per acre at 3 locations with the preplant incorporated treatments indicating that downy bromegrass control is economical with trifluralin and/or triallate.

The results of a state-wide uniform herbicide trial indicate that diclofop, trifluralin and triallate will provide consistent control of downy bromegrass (Montana Agricultural Experiment Station, Bozeman, MT 59717).

Downy bromegrass control with 7 herbicide treatments tested at 5 locations in Montana in 1981.

No.	Herbicide	Rate LB/A	Downy bromegrass plants/ft^2 (Winter wheat plants/linear foot of row)[1] Experiment Location: Creston	Moccasin	Gt. Falls	Havre	Bozeman	Mean	Mean crop yield[2] Bu/A	Mean Downy Bromegrass control[3] %
1	Diclofop	1.00	1.9(5.4)	9.0(14.7)	0.3(6.3)	1.3(8.6)	1.0(9.3)	2.7(8.9)	34.1	73
2	Diclofop	1.50	2.6(4.9)	5.7(15.3)	0.0(6.5)	0.2(7.2)	0.0(9.0)	1.7(8.6)	36.7	83
3	Trifluralin	0.75	2.3(4.3)	5.7(13.7)	0.8(6.0)	0.4(6.1)	1.0(6.0)	2.0(7.2)	36.4	80
4	Trifluralin	1.00	2.1(4.8)	7.3(15.0)	0.5(5.5)	2.6(6.7)	0.7(6.7)	2.6(7.7)	36.6	74
5	Triallate	1.25	1.3(4.2)	4.3(15.0)	0.5(6.3)	0.6(7.7)	2.0(9.0)	1.7(8.4)	37.5	83
6	Trifluralin Triallate	0.75 1.25	1.1(4.6)	2.0(15.7)	0.3(5.3)	0.6(6.3)	0.7(6.3)	1.3(7.6)	38.1	87
7	Metribuzin	0.50	4.2(4.5)	8.0(16.3)	2.3(6.0)	1.6(7.3)	8.3(8.0)	4.9(8.4)	26.1	51
8	Control	----	8.2(4.3)	23.7(15.7)	3.0(6.5)	6.5(8.1)	9.3(9.7)	10.1(8.9)	25.8	0

LSD .05 = 3.2 1.1

[1] Each figure is the mean of 12 plant counts per location.

[2] Each figure in this column is the mean of 3 locations (Moccasin, Creston and Bozeman).

[3] Each figure in this column was calculated using the mean number of downy bromegrass plants per treatment compared to the control.

Multiple soil incorporation trial using propham, diclofop, and trifluralin for selective downy brome control in winter wheat. Rydrych, D.J. Herbicides that need soil incorporation for activation create other problems that are not desirable for arid winter wheat production. Soil incorporation reduces soil moisture and can cause excessive soil erosion by wind and water. Trifluralin requires two incorporations to be completely activated for downy brome control in wheat. Diclofop and propham only need one incorporation for adequate grass control. As a result, a field study was conducted on the Pendleton Station to evaluate the effects of incorporation on the activity of propham, diclofop, and trifluralin. Incorporation rates were 0, 1, or 2 using a flextine harrow to a depth of 3 inches. Plots were replicated three times using a randomized complete block design. The results are recorded in the table.

Trifluralin required one or two incorporations for effective downy brome control. Diclofop needed at least 1 incorporation for good activation. However, propham was effective by zero incorporation and by 1 incorporation with fair crop safety. These tests indicate that propham and diclofop-methyl can be activated with minimum soil disturbance which can be of great value in areas that are developing reduced tillage systems. None of the herbicides in this program have activity on downy brome when used postemergence on wheat. (OSU - Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Multiple soil incorporation of herbicides for downy brome control in winter wheat --Oregon

Treatment[1]	Rate lb/A	Rate of incorporation[2]	Downy brome control %	Crop injury %	Wheat yield lb/A
trifluralin	.75	0	68	0	4670
trifluralin	.75	1	91	0	6120
trifluralin	.75	2	96	0	5840
diclofop-methyl	1.00	0	88	0	5450
diclofop-methyl	1.00	1	96	0	5790
diclofop-methyl	1.00	2	98	0	5080
propham	.75	0	95	0	6560
propham	.75	1	93	2	6270
propham	.75	2	99	4	6300
Control	----	0	0	0	4020
Control	----	1	0	0	4680
Control	----	2	10	0	5090

[1]Treated October 1, 1980

[2]Incorporated - 0, 1, or 2 times using flextine harrow

Propham and SSH 0860 PPI applications for jointed goatgrass control in winter wheat. Rydrych, D.J. In 1980, propham and SSH 0860 were incorporated to a depth of 3 inches prior to winter wheat seeding. Jointed goatgrass control was only partially effective using propham with no control using SSH 0860. The experiment was established on September 24, 1980 in Union County, Oregon, on silt loam soil. Plots were 10 feet by 40 feet and replicated three times in a randomized complete block design. The results are recorded in the table.

Propham was applied at .75 and 1.5 lb/ai A and averaged less than 50% control of jointed goatgrass in winter wheat with fair crop safety. SSH 0860 gave no control of jointed goatgrass. Broadleaf weeds must be controlled with other herbicides when using propham for broad spectrum weed control. (OSU - Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Propham and SSH 0860 PPI applications for jointed goatgrass (Aegilops cylindrica) control in winter wheat

Treatment[1]	Rate lb/A	Percent goatgrass control[2]				Crop[2] injury
		R1	R2	R3	Ave.	%
propham	.75	40	30	50	40	4
propham	1.50	70	50	60	60	12
SSH 0860	1.00	0	0	0	0	0
SSH 0860	2.00	0	0	0	0	0
Control	----	0	0	0	0	0

[1]Treated September 24, 1980 - Incorporated twice using field cultivator and flextine harrow

[2]Goatgrass - 5 plants/yd^2

Propham for selective downy brome control in winter wheat using a preplant technique. Rydrych, D.J. Propham has excellent activity on downy brome and can be used selectively in winter wheat with a minimum of soil incorporation. Propham was incorporated once to a depth of 2 inches using a rod weeder. Plots 10 feet by 20 feet were replicated three times in a randomized complete block design. This technique could be of great value in areas that practice minimum tillage and must maintain some straw on the soil surface. Propham activity is decreased very little on trashy seedbeds.

Propham was much more active on downy brome than either trifluralin or diclofop-methyl. However, some crop injury was evident in the propham plots at rates of 1 lb/A or greater. Crop injury was recorded as suppression of crown roots and top growth but had no permanent effect on winter wheat yield. More tests are planned in 1981. (OSU - Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Propham for selective downy brome control in winter wheat using PPI techniques. Pendleton, Oregon

Treatment[1]	Rate lb/A	Percent downy brome control				Crop[2] injury
		R1	R2	R3	Ave.	%
propham	.75	92	98	99	96	0
propham	1.00	98	96	98	97	1
propham	1.50	99	92	96	96	6
diclofop-methyl	1.00	90	88	88	89	0
trifluralin	.75	94	80	92	89	0
Control	----	0	0	0	0	0

[1]Treated PPI October 11, 1980 and incorporated once using flextine harrow

[2]Crop injury as suppression

Wild oat control in winter wheat. Rydrych, D.J. A trial was established at Island City, Oregon, in 1981 to determine the effectiveness of SD 45328 for the selective control of wild oats in winter wheat. This was the second year for testing this material using difenzoquat, diclofop-methyl, and barban as controls. Treatments were applied on April 15, 1981 when wild oats were 1- to 3-leaf with all materials except difenzoquat. SD 45328 and difenzoquat were also applied on April 30, 1981 when wild oat growth averaged 3- to 4-leaf. Winter wheat growth averaged 4 tillers on April 15 and 4- to 5-tiller on April 30, 1981. Each plot was 8 ft. by 20 ft. and replicated three times using a randomized complete block design. Flat fan 8002 Teejet stainless steel nozzles at 30 psi were used to obtain a volume of 20 GPA. The results are recorded in the table.

Diclofop-methyl and difenzoquat gave excellent control of wild oat. Diclofop-methyl had better crop selectivity. SD 45328 gave relatively good wild oat control at rates greater than .18 lb/A and on either 1- to 3-leaf or 3- to 4-leaf plants. SD 45328 has excellent winter wheat tolerance. SD 45328 appears to have good activity on wild oat at varying growth stages and could be an effective herbicide in the Pacific Northwest when used at rates of .18 to .25 lb/A. (OSU - Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Wild oat control in winter wheat at Island City, Oregon - 1981

Treatments[1]	Rate lb/A	Wild oat stage	Wild oat[2] control %	Crop[3] injury %	Wheat yield lb/A
SD 45328	.15	1-3 L	83	0	3040
SD 45328	.18	1-3 L	97	0	3940
SD 45328	.25	1-3 L	93	3	3740
diclofop-methyl	1.25	1-3 L	96	0	3760
barban	.25	1-3 L	83	0	3130
SD 45328	.15	3-4 L	90	0	3530
SD 45328	.18	3-4 L	87	0	3200
SD 45328	.25	3-4 L	97	0	4000
difenzoquat	1.00	3-4 L	98	3	3320
Control	----	-----	0	0	3030
Weeded control	----	-----	100	0	3960

[1]Treatments - 1-3 leaf - April 15, 1981
3-4 leaf - April 30, 1981

[2]Wild oat - 10 plants/ft^2

[3]Wheat injury as suppression

Influence of preemergence surface and postemergence herbicide applications for ripgut brome control in winter wheat. Schumacher, W. J., D. C. Thill, and R. H. Callihan. A study was initiated at Waha, Idaho to evaluate preemergence surface (PES) and postemergence, spring applied herbicides for the control of ripgut brome in winter wheat (var. Peck) planted on November 16, 1980. PES treatments were applied on November 18, 1980 using a knapsack sprayer calibrated to deliver 378.5 l/ha. Air temperature was 11.1 C, soil temperature was 4.4 C at 15 cm, and the relative humidity was 72%. Postemergent applications were applied using the same equipment at the same per hectare rate on April 14, 1981 when the winter wheat plants were in the 3-leaf to 3-tiller stage of growth and the ripgut brome was in the 2 to 5-leaf stage of growth. Air temperature was 13.8 C, soil temperature was 6.6 C at 15 cm, and the relative humidity was 70%. The population of ripgut brome at the time of the spring applications was approximately 100 plants/m^2. The study was arranged in a randomized complete block design with three replications. The plots were 2.7 by 12m in size. Visual observations of percent stand and vigor reduction were made on May 28, 1981 and plots were harvested on August 28, 1981 using a small plot combine.

The ground was frozen at the time of application of the PES treatments and seeding. This resulted in approximately 60% of the wheat seed left on the soil surface at planting time.

The only treatments that effectively controlled ripgut brome was SSH-0860 at 2.24 kg/ha with no resulting crop injury, and metribuzin + propham at 0.28 + 1.68 kg/ha, with a resulting crop stand reduction of 95% (see Table).

Only four treatments were harvested because most herbicides either failed to control ripgut brome, killed the crop, or a combination of both factors. Both treatments of SSH-0860 resulted in crop yields that were significantly greater than the untreated check (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Ripgut brome control in winter wheat

Herbicide Treatment	Rate	Type of Application	Crop SR[3]	Crop VR[4]	Ripgut Brome SR	Ripgut Brome VR	Yield[2]
	(kg/ha)		------------	------------	(%)	------------	(kg/ha)
check	-	-	0c[1]	0c	0d	0e	201c
diclofop	1.12	PES	0c	0c	8c	3ce	322c
diclofop	1.4	PES	0c	0c	12c	8ac	
diclofop + triallate	1.12 + 1.4	PES	0c	0c	10c	10ab	
diclofop + triallate (10g)	1.12/16.8	PES/PES	0c	0c	13c	5be	
SSH-0860	.6	PES	0c	0c	12c	7ad	
SSH-0860	1.12	PES	0c	0c	50b	12a	684b
SSH-0860	2.24	PES	3b	3b	93a	10ab	1299a
SAN-315	1.12	PES	0c	0c	0d	0e	
SAN-315	2.24	PES	0c	0c	0d	0e	
chlorsulfuron + metribuzin	0.1 + 0.3	POST SPRING	0c	0c	0d	0e	
chlorsulfuron + SOL-32	0.0175 + 30%	POST SPRING	0c	0c	0d	2de	
metribuzin + SOL-32	0.168 + 30%	POST SPRING	0c	0c	0d	0e	
metribuzin + X-77	0.168 + 0.2%	POST SPRING	0c	0c	0d	0e	
metribuzin	0.42	POST SPRING	0c	0c	0d	3ce	
metribuzin + propham	0.28 + 1.68	PES	95a	23a	95a	7ad	
propham	1.68	PES	0c	0c	0d	3ce	

[1]Means within a column followed by the same letter(s) are not significantly different at the 0.05 level of probability according to Duncan's multiple range test.

[2]Treatments with missing yield values were not harvested resulting from inadequate control of ripcut brome or insufficient crop stand establishment.

[3]SR = visual estimate of percent stand reduction when compared to the untreated check

[4]VR = visual estimate of percent vigor reduction when compared to the untreated check

The effect of spring applied herbicides for broad-spectrum weed control in winter wheat. Schumacher, W. J., D. C. Thill, D. W. Morishita, and R. H. Callihan. This study was established at Waha, Idaho to study the effect of spring applied herbicides for broad-sprectrum weed control in winter wheat (var. Walladay). Treatments were applied on April 14, 1981 with a CO_2 pressurized backpack sprayer calibrated to deliver 187 l/ha, when the crop was in the three-leaf and two tiller stage of development. Air temperature was 10.5 C, soil temperature was 7.5 C at 15 cm and the relative humidity was 69%. Broadleaf weeds were from the rosette to 5 cm in height stage of development. The experimental design was a randomized complete block with three replications. Each plot measured 3 x 7 m is size. Visual observations were made on May 29, 1981 and the plots were harvested on August 11, 1981 using a small plot combine.

All treatments resulted in no crop stand or vigor reduction at the time of evaluation. Plots treated with chlorsulfuron at 0.035 kg/ha resulted in the best control of Cauculis microcarpa, (California hedge-parsley) and fixweed. Plots treated with dicamba, dicamba + metribuzin and metribuzin + bromoxynil at 0.14 + 0.28 and 0.14 + 0.42 kg/ha resulted in 90% or greater control of catchweed bedstraw. The grain yield of all treatments was greater then the untreated check with the plot treated with the formulated mixture of acifluorfen at 0.42 kg/ha resulting in the highest yield of all treatments (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Broadleaf weed control in winter wheat

Treatment	Rate	Cauculis microcarpa SR[2]	Cauculis microcarpa VR[3]	Flixweed SR	Flixweed VR	Catchweed Bedstraw SR	Catchweed Bedstraw VR	Yield
	(kg/ha)	(%)						(kg/ha)
check	-	0g[1]	0e	0f	0f	0d	0e	260d
dicamba	0.15	13dg	0e	53c	10ce	90a	53bc	527bd
metribuzin	0.15	7fg	0e	17ef	0f	3cd	0e	266d
dicamba + metribuzin	0.15 +0.15	23cg	0e	90a	18bc	98a	77ab	727ad
dicamba + metribuzin	0.15 +0.28	40cf	0e	80ab	13be	100a	100a	1074ad
metribuzin + bromoxynil	0.14 +0.28	30cg	7de	53c	17bd	93a	7de	748ad
metribuzin + bromoxynil	0.14 +0.42	43ce	3de	67bc	13be	90a	13de	844ad
metribuzin + bromoxynil	0.28 +0.28	30cg	3de	57bc	17bd	73a	15de	1453ad
metribuzin + bromoxynil	0.28 +0.42	35cf	7de	47ce	17bd	83a	20de	1030ad
bifenox	0.56	50bc	7de	50c	3ef	17cd	23de	1134ad
bifenox + MCPA	0.56 +0.56	77ab	17cd	100a	100a	0d	17de	1044ad
MCPA	0.56	47bd	30b	100a	100a	0d	7de	1287ac
acifluorfen	0.42	53bc	27bc	80ab	23b	83a	17de	1643a
metribuzin + bromoxynil + MCPA	0.14 + (0.28 +0.28)	13dg	10de	90a	23b	0d	7de	1212ac
metribuzin	0.25	23cg	10de	43cd	3ef	0d	0e	584bd
bromoxynil	0.25	23cg	0e	20df	0f	17cd	0e	420cd
diuron + bromoxynil	0.45 +0.28	10eg	3de	37ce	7df	27c	7de	858ad
diuron	0.45	20eg	7de	17ef	0f	0d	0e	363cd
chlorsulfuron	0.035	95a	93a	100a	100a	50b	33cd	1226ac

[1] Means within the same column followed by the same letter(s) are not significantly different at the 0.05 level of probability according to Duncan's muliple range test.

[2] SR = visual estimate of percent stand reduction when compared to the untreated check.

[3] VR = visual estimate of percent vigor reduction when compared to the untreated check.

Effects of fall and spring applied herbicides for broadleaf weed control in winter wheat. Thill, D. C., W. J. Schumacher, and R. H. Callihan. In the fall of 1980, a study at Lewiston, Idaho, was initiated to compare fall and spring applied herbicides for broadleaf weed control in winter wheat (var. Nugaines). On October 20, 1980, all fall herbicides were applied postemergence. Air and soil temperature at the time of application was 7.7 and 3.9 C at 10 cm, respectively. The crop was in the 2- to 3-leaf stage of development. Relative humidity was 67% with a 90% cloud cover. Of the three weed species evaluated, snow speedwell had emerged and was in the cotyledon stage. All spring herbicides were applied on April 14, 1981 with air and soil temperatures of 10 and 7.7 C at 15 cm, respectively. Relative humidity was 96% and cloud cover 5%. All treatments were applied with a CO_2 pressurized knapsack sprayer calibrated to apply 374 l/ha. The experimental design was in a randomized complete block with three replications. Each individual plot measured 2.7 x 9.1 m in size. Visual evaluations of the three weed species and the crop were made on April 29, 1981. The plots were harvested on August 20, 1981, using a small plot combine.

Of the fall applied herbicides, chlorsulfuron at 0.18 and 0.035 kg/ha along with DPX-5648 at a 0.009 and 0.018 kg/ha provided 100% control of the weeds present (see Table). Significant crop injury was observed at the highest level of DPX-5648 but there was no yield difference in comparison to the untreated check. Spring applied chlorsulfuron at 0.009 and 0.018 kg/ha, metribuzin + bromoxynil at 0.42 + 0.42 kg/ha, and metribuzin + chlorsulfuron at 0.28 + 0.009 kg/ha, resulted in 100% control of all weed species. Dicamba at 0.15 kg/ha and the other dicamba tank mixes applied in the fall resulted in the least amount of weed control. There were no yield differences between the treatments and the untreated check in this study. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Broadleaf weed control in winter wheat

Treatment	Rate	Crop SR[2]	Crop VR[3]	Snow Speedwell SR	Snow Speedwell VR	Blue Mustard SR	Blue Mustard VR	Field Pennycress SR	Field Pennycress VR	Yield
	(kg/ha)	(%)								(kg/ha)
dicamba (F)	0.15	0b	0d	0e	0c	17de	0b	3c	7d	5342ab
dicamba + MCPA (F)	0.15 + 0.28	0b	0d	37cd	7c	43bd	17b	57b	60b	4991ab
dicamba + 2,4-D (F)	0.15 + 0.42	0b	0d	33cd	7c	72ab	12b	43b	13d	5393ab
dicamba + bromoxynil (F)	0.15 + 0.28	0b	0d	13de	5c	32ce	18b	52b	35c	6080ab
chlorsulfuron (F)	0.018	0b	0d	100a	100a	100a	100a	100a	100a	4585b
chlorsulfuron (F)	0.035	0b	0d	100a	100a	100a	100a	100a	100a	7253a
DPX-5648 (F)	0.009	2b	5b	100a	100a	100a	100a	100a	100a	5988ab
DPX-5648 (F)	0.018	13a	10a	100a	100a	100a	100a	100a	100a	7158a
chlorsulfuron (S)	0.009	0b	3bc	100a	100a	100a	100a	100a	100a	5636ab
chlorsulfuron (S)	0.018	0b	2cd	100a	100a	100a	100a	100a	100a	7095a
SAN-315 (S)	1.12	0b	0d	80ab	47b	97a	77a	100a	100a	7009a
SAN-315 (S)	2.24	0b	0d	97a	83a	100a	100a	100a	100a	6874ab
metribuzin + bromoxynil (S)	0.42 + 0.42	0b	2cd	100a	100a	100a	100a	100a	100a	6308ab
SSH-0860 (S)	1.12	0b	0d	53bc	7c	60ac	15b	100a	100a	6806ab
metribuzin + chlorsulfuron (S)	0.28 + 0.009	0b	0d	100a	100a	100a	100a	100a	100a	6815ab
check	-	0b	0d	0e	0c	0e	0b	0c	0d	6816ab

[1] Means within a column followed by the same letter are not significantly different at the 0.05 level of probability according to Duncan's multiple range test.

[2] SR = % stand reduction

[3] VR = % vigor reduction

Response of winter and summer crops to selective, postemergence grass herbicides. Doty, C. H. and K. C. Hamilton. Selective, postemergence grass herbicides were evaluated on four winter and four summer crops in the fall of 1980 and the spring of 1981 at Mesa, Arizona. On October 22, 1980 two rows per bed of Sunbar 409 barley, Twin spring awnless wheat, Mesa Sirsa alfalfa, and Empire lettuce were planted. Herbicides were applied November 19 when barley and wheat were 10 inches tall, alfalfa was 3 inches tall, and lettuce was 2 inches tall (three to four true leaves). On April 17, 1981 one row per bed of Goldie sweet corn, NK-300 sorghum, Rillito soybean, and DPL-70 cotton were planted. Herbicides were applied May 13 when corn was 10 inches tall, sorghum was 12 inches tall, soybean was 8 inches tall and cotton 6 inches tall. Herbicides were applied in a 13-inch band over the crop in 20 or 40 gpa water. Plots were one 40-inch bed, 25 feet long, and treatments were replicated four times. The test was furrow irrigated as needed and cultivated once.

None of the herbicides cause abnormal or stunted growth on alfalfa and lettuce in the fall crops test. Barley was effectively controlled by both rates of all herbicides except the low rate of CGA-82725 (Table 1). Wheat was effectively controlled by the 1.0 lb/A rate of RO-13-8895 and Bas-90520H. In the summer crops test all herbicides except Bas-90520H caused purple-colored bronzing of cotton foliage contacted by the spray. No stunting of cotton was observed. The 1 lb/A rate of all herbicides caused some stunting of soybeans (Table 2). All treatments, except 0.5 lb/A of Bas-90520H and CGA-82725 controlled corn. RO-13-8895 and the 1.0 lb/A rate of CGA-82725 and fluazifop controlled sorghum. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721.)

Table 1. Response of two winter crops to postemergence herbicides

Treatment		Percent control estimated			
		Barley		Wheat	
Herbicide	lb/A[a]	Dec.	Jan.	Dec.	Jan.
RO-13-8895	0.5	71	99	45	74
RO-13-8895	1.0	91	100	63	100
Bas-90520H	0.5	83	80	64	65
Bas-90520H	1.0	90	98	74	94
CGA-82725	0.5	53	51	11	1
CGA-82725	1.0	65	87	23	6
No Herbicide		0	0	0	0

[a] 0.5 lb/A applied in 20 gpa, 1.0 lb/A applied in 40 gpa.

Table 2. Response of three summer crops to postemergence herbicides

Treatment[a/]		Percent control estimated					
		Corn		Sorghum		Soybean	
Herbicide	lb/A[b/]	May	June	May	June	May	June
RO-13-8895	0.5	100	100	100	99	0	0
RO-13-8895	1.0	100	100	100	100	5	3
Bas-90520H	0.5	85	65	75	23	0	0
Bas-90520H	1.0	91	86	83	23	10	6
CGA-82725	0.5	38	30	84	46	0	0
CGA-82725	1.0	98	96	93	94	8	1
Fluazifop	0.5	97	98	86	43	0	0
Fluazifop	1.0	98	99	94	81	8	3

a/ X-77 adjuvant 0.5% added to all treatments.

b/ 0.5 lb/A applied in 20 gpa, 1.0 lb/A applied in 40 gpa.

The effect of chlorsulfuron and tillage systems on crop growth and weed control. Morishita, D. W., D. C. Thill and R. H. Callihan. The availability of herbicides for no-till agriculture is becoming increasingly important in northern Idaho. A study was initiated to compare the dissipation of fall-applied chlorsulfuron at 0.07 kg/ha in no-till and conventional tillage systems. Four crops were planted in the spring to determine the effect on crop injury and weed control. Plots were established October 23, 1980 in a completely random design with split plots split sub-plots arranged as a split block with four replications. The study site was located at Moscow, Idaho on a uniform 25% slope. Soil type was a Palouse silt loam containing 2.12% organic matter, with a pH of 6.07 and CEC 17.15 meq/100 gm soil. The chlorsulfuron was applied with a tractor-mounted sprayer calibrated to deliver 280.6 l/ha. Environmental conditions at the time of application were clear skies, 40% relative humidity, air temperature 12 C and wind speed 9 km/h. Soil temperature at 12 cm was 10 C. Plot size for the herbicide treatment was 4.5 x 22 m. Tillage system plots were 9.1 x 22 m and crop plots were 4.9 x 9.1 m. Spring crops, barley (var. Boyer), wheat (var. Fielder), peas (var. Alaska), and sunflower (var. 894) were planted May 18, 1981. The sunflower was thinned to 5 plants per M upon emergence. Visual evaluations, plant height, plant density, and first biomass samples were taken July 16. Second biomass samples were taken August 5. Biomass was obtained by harvesting two 1 meter rows from each crop and averaging the dry weights of the two rows.

Weed control in all treated plots was excellent. Crop injury, crop height, crop density, and biomass were not different in any of the crops between the treated no-till and conventional tillage plots except for the peas, where a vigor reduction was observed. Sunflower biomass taken from the second sampling date in the nontreated plots was greater in the no-till than the conventional tillage. The greater reduction of pea vigor in the no-till system may indicate a higher amount of herbicide present, however, this was not observed among the other crop growth measurements or the weed control. The greater biomass of the nontreated no-till sunflower plots may be due to a moisture conservation factor. Pea and sunflower crop injury was higher than the wheat and barley crop injury as expected. Injury and weed control in all treated plots clearly indicates the presence of chlorsulfuron in both tillage systems. The amount of chlorsulfuron present in the two tillage systems was not different. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Effects of chlorsulfuron and tillage on crop growth and weed control.

	Growth Measurements						Weed Control					
	Crop		Crop	Plant/m	Biomass 5/		Lambsquarter		Mayweed		Knotweed	
	SR 3/	VR 4/	height	row	7/16	8/5	SR	VR	SR	VR	SR	VR
Barley	---(%)---		(cm)				---------------(%)---------------					
check x NT 1/	0	0	31	36	21	83	0	0	0	0	0	0
check x CT 2/	0	0	27	32	24	64	0	0	0	0	0	0
chlorsulfuron x NT	0	8	28	38	17	64	100	100	100	100	100	100
chlorsulfuron x CT	0	6	23	38	13	66	100	100	97	73	100	100
$LSD_{0.05}$	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Wheat												
check x NT	0	0	39	40	33	95	0	0	0	0	0	0
check x CT	0	0	41	37	52	94	0	0	0	0	0	0
chlorsulfuron x NT	0	0	36	42	40	96	100	100	100	100	100	100
chlorsulfuron x CT	0	0	41	39	47	104	100	100	100	100	100	100
$LSD_{0.05}$	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Peas												
check x NT	0	0	40	22	48	80	0	0	0	0	0	0
check x CT	0	0	40	18	62	84	0	0	0	0	0	0
chlorsulfuron x NT	0	79	12	17	13	13	100	100	100	100	100	100
chlorsulfuron x CT	0	58	19	21	15	21	100	100	100	100	100	100
$LSD_{0.05}$	NS	8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sunflower												
check x NT	0	0	28	5	29	549	0	0	0	0	0	0
check x CT	0	0	31	5	40	274	0	0	0	0	0	0
chlorsulfuron x NT	90	85	3	2	0.4	15	100	100	100	100	100	100
chlorsulfuron x CT	49	70	5	5	0.1	0	100	100	99	99	100	100
$LSD_{0.05}$	NS	NS	NS	NS	NS	84	NS	NS	NS	NS	NS	NS

1/ NT = no-till
2/ CT = conventional tillage
3/ SR = stand reduction compared to the check
4/ VR = vigor reduction compared to the check
5/ grams dry weight/meter row

Oat cover crop control in newly seeded alfalfa. Parker, R. Plots were established at the Irrigated Agriculture Research and Extension Center to evaluate the effectiveness of various herbicides for oat cover crop control in newly seeded alfalfa (variety, Vernal). The oats and alfalfa were seeded May 12, 1981 and sprinkler irrigated. The entire plot area was broadcast treated with 1.0 lb/A 2.4-DB amine June 4, 1981 to control broadleaf weeds. The experimental herbicides were applied June 20, 1981 with a three-nozzle CO_2 pressurized backpack sprayer calibrated to deliver 24 gpa. Plots were 5 by 30 feet, arranged in a randomized complete block with four replications. Air temperature was 64°F with 55% relative humidity and soil temperature at 6 inches was 59°F. Soil type was a very fine sandy loam, 1.6% organic matter with a pH of 7.3. The alfalfa and oat growth at the time of treatment were: alfalfa, 5 to 8 inches tall with 9 to 15 trifoliolate leaves; oats, 8 to 14 inches tall and jointing. Cover crop control and alfalfa injury were rated visually on July 8 and August 13, 1981.

Alfalfa was injured only in the plots treated with paraquat. The alfalfa recovered by the second evaluation, but common lambsquarters and green foxtail were abundant throughout the paraquat treatment. A very light infestation of broadleaf and grass weeds were present in the other treatments. Control of the oat cover crop was excellent with BAS 9052 OH, Ro 13-8895, and fluazifop. (Washington State University, Irrigated Agriculture Research and Extension Center, Prosser, WA 99350)

Oat control and alfalfa injury

Herbicides	Rate lb ai/A	Percent oat control[1/] 7/8	8/13	Percent alfalfa injury 7/8	8/13
BAS 9052 OH + MorAct 1 qt/A	0.5	99 a	99 a	0	0
BAS 9052 OH + MorAct 1 qt/A	1.0	100 a	99 a	0	0
Ro 13-8895 + X-77 0.25% v/v	0.5	99 a	96 a	0	0
Ro 13-8895 + X-77 0.25% v/v	1.0	99 a	98 a	0	0
Fluazifop + X-77 0.1% v/v	0.5	99 a	95 a	0	0
Fluazifop + X-77 0.1% v/v	1.0	99 a	99 a	0	0
Paraquat + X-77 0.625% v/v	0.5	72 b	59 b	61	5[2/]
Asulam	0.835	3 cd	10 d	0	0
Asulam	1.67	3 cd	4 d	0	0
Asulam	3.34	6 c	58 b	0	0
Diclofop	1.0	5 cd	34 c	0	0
Diclofop	1.5	5 cd	35 c	0	0
Untreated control	-	0 d	0 d	0	0

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

[2/]Alfalfa recovered but was stunted slightly. Annual weeds (common lambsquarters and green foxtail) were abundant in paraquat treatment.

Effect of chlorsulfuron soil persistence on biomass production of five crops. Sampson, T. C., D. C. Thill, and R. H. Callihan. This research was conducted at two locations in northern Idaho to evaluate the effect of chlorsulfuron soil residue one year after application on recropping after winter wheat. Chlorsulfuron was applied to winter wheat on April 16, May 3 and May 17, 1980 at location I near Potlatch and on April 18, May 3 and May 17, 1980 at location II near Moscow. Chlorsulfuron was applied at 0.0175, 0.035, and 0.070 kg/ha for both locations. The plots were 2.7 x 9.1 m in size. The 1980 wheat was harvested and plots were left in stubble until the spring of 1981. Plots were disced, harrowed and rototilled before planting rotational crops on June 3, 1981. Four rows each of peas (var. small sieve Alaska) lentils (var. Chilean), barley (var. Kimberly) safflower (var. S-208), and sunflower (var. DO704-XL) were planted across the width of each plot. The experimental design was a randomized complete block with a factorial arrangement of treatments. A 1.52 m sample was taken from the center of the two most vigorous rows of each crop for biomass determination. Peas and lentils were harvested when pods were beginning to fill, barley was harvested when headed, and safflower and sunflower were harvested in full bloom. All plants were cut at ground level and oven dried before weighing.

Chlorsulfuron soil persistence resulted in more rotational crop injury at location II than at location I (Tables 1 and 2). At location I, of all crops tested only the biomass production of lentils was reduced at the 0.070 kg/ha rate applied in May. At location II, lentil biomass was significantly reduced at all rates and dates of application. Biomass production of peas was significantly reduced at the 0.035 kg/ha rate on all application dates. Sunflower biomass production was significantly reduced at the .070 kg/ha rate at all application dates. Biomass production of barley and safflower was not significantly affected.

Visual evaluations were made at both locations on July 19, 1981 (data not shown). Visual evaluations conformed to the same trend as the biomass production, however, vigor reduction was more pronounced for all crops except barley at both locations. The differences in rotational crop responses at the two locations may be due to the higher organic matter content of the soil at location II (4.18%) compared to location I (2.97%) (University of Idaho, Moscow, Idaho 83843).

Table 1. Effect of chlorsulfuron soil persistence on biomass production at location I.

Treatment	Rate kg/ha	Application Date 1980	Dry Weight 1981 g				
			Peas	Lentils	Barley	Safflower	Sunflower
Check			221.77	152.53	254.27	611.40	560.67
Chlorsulfuron	0.0175	Apr. 18	190.37	165.83	208.60	718.13	559.33
		May 3	223.83	162.23	247.73	660.23	604.33
		May 17	191.20	163.67	264.97	662.17	456.33
Chlorsulfuron	0.035	Apr. 18	236.17	121.63	224.50	521.33	564.67
		May 3	221.20	161.40	227.17	623.13	559.67
		May 17	233.23	136.53	231.40	498.57	468.00
Chlorsulfuron	0.070	Apr. 18	179.47	137.40	266.43	740.10	459.33
		May 3	194.17	74.10	200.93	638.90	498.00
		May 17	205.80	86.33	250.30	608.77	600.67
		LSD 0.05	52	63	101	298	183

Table 2. Effect of chlorsulfuron soil persistence on biomass production at location II.

Treatment	Rate kg/ha	Application Date 1980	Dry Weight 1981, g				
			Peas	Lentils	Barley	Safflower	Sunflower
Check			206.50	142.80	140.70	870.90	770.25
Chlorsulfuron	0.0175	Apr. 16	256.53	99.68	269.50	1017.03	747.25
		May 3	252.50	37.18	259.58	975.38	593.50
		May 17	193.88	40.03	178.60	1040.85	817.00
Chlorsulfuron	0.035	Apr. 16	177.25	31.43	155.40	758.88	498.75
		May 3	116.25	10.05	125.75	785.65	612.50
		May 17	210.60	27.15	213.30	783.18	533.25
Chlorsulfuron	0.070	Apr. 16	60.75	3.83	123.20	570.75	324.75
		May 3	34.13	4.18	144.75	426.50	228.75
		May 17	18.65	1.75	144.50	425.80	142.00
		LSD 0.05	83	53	100	458	317

The Persistence Of Several Soil Residual Herbicides Under Irrigated Conditions. Thill, D. C., D. L. Zamora, and C. R. Salhoff. An experiment was conducted at the Southwest Idaho Research and Extension Center located near Parma, Idaho to evaluate the persistence of several herbicides under sprinkler irrigated conditions. Plots were established in May of 1980. The soil was a silt loam with a pH of 7.2, 1.1% organic matter and a cation exchange capacity of 14 meg/100 g of air dried soil. All herbicide treatments were applied as broadcast application with a compressed air, single-wheel bicycle sprayer equipped with 8003 flat fan nozzle tips calibrated to deliver 240 l/ha at a pressure and speed of 1.9 kg/cm^2 and 4.8 km/h, respectively. Water, with a pH of 6.3, was the carrier. The experiment was arranged as a randomized complete block design with three replications. Each plot was 6.1 x 16.8 m in size. All treatments, except dicamba, were applied on May 19 and 20, 1980 and immediately incorporated to a depth of 7.6 cm with power rotovator operated at 6.4 km/h. Dicamba was applied as a nonincorporated, broadcast treatment on September 20, 1980. No crop was planted within the plot area during 1980. The experimental site was furrow irrigated three times during the summer. Weed control was periodically evaluated, afterwhich the plot area was mowed.

On April 28, 1981 the entire area was sprayed with 0.56 kg/ha of glyphosote using a tractor mounted plot sprayer. Tillage subplots, 6.1 x 5.6 m in size, were established on May 2, 1980 by dividing the main herbicide plots lengthwise. The initial tillage treatments were plow, disc, and no tillage. On May 5 through 8, 1981 the following crops were planted in each subplot; potatoes (var. Russet Burbank), sugarbeets (var. AH-14), lettuce (var. Mesa 659 M.T.), alfalfa (var. Saranac Fielder), sweet corn (var. Jubilee), dry beans (var. U of I no. 114-pinto), and spring wheat (var. Fielder). Three rows of each crop were planted in each plot except for potatoes which were planted in a single row. The plot area was sprinkler irrigated five times during June and July. Visual evaluations of crop stand (SR) and crop vigor (VR) reduction were made on June 2 and 3, and June 30, 1981.

The data shown in the table are an average of both evaluation dates and all tillage treatments. Specific comments for each crop are as follows.

Potato. Herbicide treatments causing substantial injury in potatoes were DPX-5648 applied at 0.03 kg/ha and chlorosulfuron at 0.03 and 0.07 kg/ha. In general, all other treatments resulted in less than 20% SR and VR.

Sugarbeet. One year after herbicide treatment, several herbicide treatments caused extensive SR and VR in sugarbeets. These were DPX-5648, chlorsulfuron, atrazine, oryzalin, terbacil and hexazinone.

Alfalfa. Applications of DPX-5648, chlorsulfuron, atrazine, terbacil and hexazinone caused severe injury in alfalfa.

Sweet Corn. Treatments causing injury in sweet corn were DPX-5648, chlorsulfuron, terbacil, hexazinone and dicamba.

Dry Beans. Applications of atrazine at 2.69 kg/ha, both rates of terbacil and hexazinone and the highest rate of dicamba caused unacceptable injury in dry beans.

Spring Wheat. Injury in spring wheat was observed from the following treatments: DPX-5648 at 0.03 kg/ha, atrazine at 1.3 and 2.69 kg/ha, both rates of terbacil, the highest rate of hexazinone, and all rates of dicamba.

Lettuce. Moderate to severe injury was observed in lettuce treated with DPX-5648, chlorsulfuron, atrazine, terbacil and hexazinone.

Overall, the most persistent herbicide treatments under these particular test conditions were DPX-5648, chlorsulfuron, atrazine, terbacil and hexazinone, Injury was usually most severe in the no tillage and disc treatments, with the least amount of SR and VR occurring in the plowed plots. The evidence suggests that these herbicides should not be used at the rates tested in a crop rotation where sensitive species are to be planted within a minimum of one year after application.

Effect of herbicide persistence on stand establishment and plant vigor of several irrigated crops seeded one year after herbicide application

1980 Herbicide Treatment	Rate kg/ha	Potato SR[1]	Potato VR[2]	Sugarbeet SR	Sugarbeet VR	Alfalfa SR	Alfalfa VR	Corn SR	Corn VR	Dry Bean SR	Dry Bean VR	Wheat SR	Wheat VR	Lettuce SR	Lettuce VR
		%													
DPX-5648	0.01	12	9	46	31	17	39	36	45	5	9	21	10	33	26
DPX-5648	0.03	27	45	64	69	11	59	31	61	9	9	25	25	61	64
chlorsulfuron	0.01	13	21	57	36	37	54	46	64	21	9	9	2	48	37
chlorsulfuron	0.03	28	48	78	73	56	71	54	77	11	9	11	8	66	69
chlorsulfuron	0.07	23	54	85	69	38	68	60	79	16	6	23	15	69	60
atrazine	0.90	1	1	46	13	50	45	19	6	14	14	26	21	66	53
atrazine	1.30	4	6	58	34	35	43	19	8	27	20	45	28	61	52
atrazine	2.69	10	1	72	64	67	77	9	4	34	52	51	74	78	67
metribuzin	0.56	11	4	4	1	7	0	14	9	25	3	7	4	22	3
metribuzin	1.12	11	5	4	1	10	3	12	6	17	7	14	3	35	8
trifluralin	0.50	7	4	10	2	4	1	34	7	34	1	18	8	17	2
trifluralin	1.12	6	2	3	2	1	1	15	12	19	4	16	2	9	1
ethalfluralin	1.68	9	8	6	1	3	2	15	3	14	1	14	3	20	1
ethalfluralin	3.36	9	6	23	7	1	7	4	4	13	3	10	4	24	3
oryzalin	2.24	4	4	22	8	3	7	19	14	19	7	24	12	20	8
oryzalin	4.48	6	2	45	7	9	7	22	15	13	3	36	6	30	13
terbacil	2.24	13	14	71	52	69	56	26	32	34	41	55	67	85	69
terbacil	4.48	8	7	76	51	78	69	34	44	45	52	53	74	88	72
bensulide	5.60	7	3	3	2	1	5	21	9	15	3	4	3	14	3
bensulide	11.20	8	12	4	3	3	2	14	5	18	3	11	1	7	3
napropamide	4.48	14	7	6	4	2	3	13	9	35	1	11	5	16	6
napropamide	8.96	5	0	8	2	3	1	12	8	13	3	11	3	20	4
metolachlor	2.80	3	2	11	2	6	2	13	1	26	7	13	8	24	1
metolachlor	5.60	6	6	5	7	2	3	8	9	25	3	36	5	18	9
alachlor	3.36	3	6	4	4	4	3	28	8	21	8	17	2	12	4
alachlor	6.72	6	2	10	1	6	5	12	8	17	2	11	2	15	1
pronamide	2.24	5	1	12	5	9	3	18	8	25	3	16	5	20	5
dicamba	0.56	9	7	20	8	3	0	41	27	29	7	44	19	22	7
dicamba	2.24	14	28	36	9	6	3	41	2	24	5	44	10	27	8
dicamba	4.48	6	9	26	10	22	1	27	6	36	19	35	10	29	4
hexazinone	1.12	5	6	58	24	38	30	24	18	35	36	26	15	83	51
hexazinone	2.24	18	19	75	47	61	58	42	39	48	55	51	54	84	68
Check	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$LSD_{0.05}$		9	11	13	14	11	14	18	10	15	13	13	12	14	13

[1] SR = Visual estimate of percent stand reduction compared to the untreated check.

[2] VR = Visual estimate of percent vigor reduction compared to the untreated check.

Chemical fallow in a winter wheat-fallow rotation system. Evans, J. O. and R. W. Gunnell. Suppressing early spring weed growth and eliminating tillage operations was the objective of herbicide treatments applied to standing winter wheat stubble near Levan, Utah, November 6, 1980 and March 13, 1981. Plots were one acre in size with two replications, and herbicides were applied using a field sprayer with 8003 TeeJet nozzles calibrated for 20 gpa at 30 psi. Herbicides were sprayed alone, in tank mixes with other herbicides, and in separate fall followed by spring sequential applications. The weed spectrum included volunteer wheat (*Triticum aestivum* L), common rye (*Secale cereale* L.), bur buttercup (*Ranunculus testiculatus* L.), kochia (*Kochia scoparia* L.), blue mustard (*Chorispora tenella* L.), and Russian thistle (*Salsola Kali* L.) Percent weed control ratings on April 4, 1981 showed several treatments giving good to excellent control of all species except kochia. By early June, weed pressure, primarily from kochia and Russian thistle, became sufficiently heavy to require foliar herbicide application. (Plant Science Department, Utah State University, Logan, UT 84322).

Chemical fallow in a winter wheat-fallow rotation system

Treatment	Rate Kg/ha	Application date	Percent weed control 4-9-81 1/VW	RY	BB	KO	BM	RT
atrazine	0.56	11-6-80	45	48	80	15	78	100
atrazine	0.84	11-6-80	73	78	100	20	95	100
atrazine +	0.56 +	11-6-80						
cyanazine	1.68	3-13-81	83	88	100	25	93	100
atrazine +	0.56 +	11-6-80						
metribuzin	0.56	3-13-81	88	97	100	25	95	100
atrazine +	0.56 +	11-6-80						
propham	4.48	3-13-81	80	80	100	25	95	100
atrazine +	0.56 +	11-6-80						
cyanazine	1.68	11-6-80	93	93	100	23	93	100
atrazine +	0.56 +	11-6-80						
metribuzin	0.56	11-6-80	98	98	100	33	99	100
propham +	3.36 +	3-13-81						
metribuzin	0.56	3-13-81	75	85	95	35	43	80
cyanazine	3.36	3-13-81	15	65	60	30	28	70
control			0	0	0	0	0	0

1/ VW = volunteer wheat; RY = common rye; BB = bur buttercup; KO = kochia; BM = blue mustard; RT = Russian thistle.

Influence of DPX4189 with and without surfactants for controlling difficult broadleaf weeds. Evans, J. O. and R. W. Gunnell. Herbicidal activity of DPX4189 at four rates with and without surfactant to control several troublesome weed species was investigated in an experiment conducted in the greenhouse from December 1980 through March 1981. On December 8, 1980, rhyzome segments of Canada thistle (Cirsium arvense L.), perennial sowthistle (Sonchus arvensis L.), whitetop (Cardaria draba L.), and Scotch thistle (Onopordum acanthium L.) were collected from well-established, mature field plants and were planted in one quart pots containing a soil mix of four parts Millville silty loam soil and one part sand. Weeds were allowed to grow for 55 days at 21^{o}C without supplemental lighting after which uniform populations of plants were selected and treated. Application was made using a precision greenhouse sprayer equipped with 8001E TeeJet nozzles calibrated to deliver 20 gpa at 30 psi. Plot design was a random block with three replications. DPX4189 alone at four dosages and DPX4189 at equivalent dosages plus either X-77 or WK surfactants at two levels made up the treatments. Injury index ratings (0 = no control, 10 = complete control) were taken at two-week intervals with a final evaluation March 11, 1981. Weed response to DPX4189 rate and surfactant concentrations differed widely among the four weed species. The most pronounced difference appeared when perennial sowthistle control increased substantially while whitetop response did not. Canada thistle and Scotch thistle injury also increased with the addition of a surfactant especially at lower DPX4189 dosages. Early data indicated that WK might have been slightly more active than X-77, but later evaluations did not confirm a significant difference in surfactant activity. (Plant Science Department, Utah State University, Logan, UT 84322).

Influence of DPX4189 with and without surfactants
for controlling difficult broadleaf weeds

		Injury Index							
		2-13-81				2-25-81			
Treatment	Rate (g/ha) 1/	CT	ST	PS	WT	CT	ST	PS	WT
DPX4189	4.4	2.3	1.7	0.0	0.7	3.7	2.7	1.7	6.2
DPX4189	8.8	2.7	2.3	0.7	1.7	3.7	4.0	2.7	8.7
DPX4189	17.5	3.7	2.7	0.7	1.3	5.3	5.3	3.0	7.5
DPX4189	35.0	4.0	2.7	0.7	1.3	6.7	7.0	2.0	7.7
DPX4189 + X-77	4.4 + 0.05%	4.3	5.3	2.0	2.0	5.0	8.2	2.0	7.3
DPX4189 + X-77	8.8 + 0.05%	3.7	5.3	1.3	2.0	4.0	8.7	2.0	7.8
DPX4189 + X-77	17.5 + 0.05%	3.7	5.0	1.0	2.0	5.5	9.3	3.7	7.2
DPX4189 + X-77	35.0 + 0.05%	3.7	5.0	1.3	3.3	6.7	9.5	3.8	8.5
DPX4189 + X-77	4.4 + 0.5%	3.3	5 3	0.7	3.7	4.3	9.2	2.7	8.2
DPX4189 + X-77	8.8 + 0.5%	5.3	6.3	3.3	2.0	5.3	9.5	4.7	8.5
DPX4189 + X-77	17.5 + 0.5%	5.7	5.7	2.7	2.0	8.3	9.5	5.0	8.8
DPX4189 + X-77	35.0 + 0.5%	7.0	5.0	6.7	2.7	9.7	9.7	8.8	9.0
DPX4189 + WK	4.4 + 0.05%	4.0	3.3	0.7	3.7	4.3	6.3	1.7	8.5
DPX4189 + WK	8.8 + 0.05%	6.7	5.0	2.3	3.0	7.3	8.0	4.3	9.0
DPX4189 + WK	17.5 + 0.05%	5.7	3.7	2.7	4.0	9.0	9.2	4.3	8.7
DPX4189 + WK	35.0 + 0.05%	6.0	3.7	4.0	1.7	9.2	8.7	5.0	8.5
DPX4189 + WK	4.4 + 0.5%	5.0	4.0	1.7	4.7	7.2	8.7	3.3	8.7
DPX4189 + WK	8.8 + 0.5%	3.7	3.7	3.7	5.7	5.0	9.0	7.5	9.1
DPX4189 + WK	17.5 + 0.5%	7.7	5.3	5.0	6.0	9.7	9.5	8.3	8.7
DPX4189 + WK	35.0 + 0.5%	8.7	6.0	7.0	6.7	9.8	9.3	9.7	9.3
check		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1/ CT + Canada thistle; ST = Scotch thistle; PS = perennial sowthistle; WT = whitetop.

Dicamba residue study, 1980-1981. Henson, M.A. and R.L. Zimdahl. This study was established on the Agronomy Research Farm, Ft. Collins on October 13, 1980. The clay loam soil had 32% sand, 33% silt, 35% clay, 1.8% organic matter, pH 7.3, and a CEC of 21.5 meq/100 g. Preplant application of the herbicides was made using a bicycle sprayer with 8002 nozzle tips and 2.1 kg/cm^2 to spray 158.5 l/ha. Environmental conditions at the time of application were air temperature 20 C, soil temperature 13 C, no wind, and the soil was dry, hard and slightly cloddy. Individual plots were 3.0 m x 15.2 m and the entire area was 18.3 x 121.9 m. Three replicates of the following treatments were applied: dicamba at 0.56, 1.1 and 2.2 kg ai/ha, dicamba + 2,4-D amine at 0.56 + 1.1 kg ai/ha, dicamba + glyphosate at 0.56 + 2.2 kg ai/ha and a check. In the spring of 1981, spring wheat and barley were planted and overseeded with alfalfa. Crop variety, planting date, seeding rate, and harvest date are shown in Table 1. All crops were planted in the normal manner except alfalfa which was broadcast. Crop yields are shown in Table 2 and a discussion of each crop follows.

Spring Wheat. Visual symptoms of herbicide injury appeared in all treatments. Dicamba at 1.1 and 2.2 kg ai/ha caused slow, stunted early growth but did not affect plant number. There was no effect on yield from dicamba at 0.56 kg ai/ha or from dicamba + glyphosate at 0.56 + 1.1 kg ai/ha. Dicamba + 2,4-D at 0.56 to 1.1 kg ai/ha decreased yield 24% (860.2 kg/ha). A decrease of 59% was obtained with 1.1 kg ai/ha dicamba. Dicamba at 2.2 kg ai/ha injured the crop and no yield was obtained.

Barley. Crop injury was apparent from visual symptoms in all treatments. Early season development of the plants in treatments with 1.1 and 2.2 kg ai/ha of dicamba was slow and plants were severely stunted, although stand establishment was not affected. All treatments significantly decreased yield except dicamba + glyphosate at 0.56 + 2.2 kg ai/ha. Dicamba at 0.56 kg ai/ha and dicamba + 2,4-D (0.56 + 1.1) decreased yield 31%. Application of dicamba at 1.1 kg ai/ha resulted in a decrease of 69% and 2.2 kg ai/ha of dicamba had no yield.

Alfalfa. The seedlings emerged but did not survive in any treatment including the check.

Dicamba alone or in combination with glyphosate at a dicamba rate of 0.56 kg ai/ha or less may be used in the fall when spring wheat is to be planted. Barley was more sensitive to dicamba injury than wheat and 0.56 kg ai/ha is not a safe level of fall application for spring barley. Higher rates of dicamba and a combination of dicamba + 2,4-D amine were damaging to wheat and barley.

Table 1
Crop Information
Dicamba Plant Back Study, 1980-1981

Crop	Cultivar	Planting rate	Planting date	Harvest date
		(kg/ha)		
Spring wheat	Sterling	89.6	4/1/81	7/23/81
Barley	Steptoe	67.2	4/1/81	7/23/81
Alfalfa	Colorado common	4.0	4/16/81	-------

Table 2
Crop Yields
Dicamba Plant Back Study, 1980-1981

Treatment		Crop Yield[1/]	
Herbicide	Rate	Wheat	Barley
	(kg ai/A)	- - - - - - - (kg/ha)	- - - - - - -
Check		3602a	5516a
Dicamba	0.56	3078a	3800b
Dicamba + 2,4-D amine	0.56 + 1.1	2742b	3758b
Dicamba + glyphosate	0.56 + 2.2	3400a	4795ab
Dicamba	1.1	1465c	1693c
Dicamba	2.2	0d	0d

[1/]Yields followed by the same letter are not statistically different at P = .05 as determined by Tukey's mean separation test.

Early-spring herbicide treatments for controlling fallow-season volunteer winter wheat. Humburg, N. E. and H. P. Alley. An experiment was established at the beginning of the summer growing season for evaluating herbicides, primarily triazines, for control of volunteer winter wheat. The study was located southeast of Chugwater, Wyoming. Three plots per treatment, each 1 sq rod in area, were arranged in a randomized block design. Herbicides were applied in undisturbed wheat stubble with a hand-carried sprayer that delivered 40 gpa of water solution. Weather conditions when herbicides were applied on April 13, 1981, were as follows: air temperature, 49 F; relative humidity, 56%; wind 0 to 2 mph; the sky was partly cloudy. Soil temperatures for the surface and depths of 1, 2 and 4 inches were 99, 80, 61 and 51 F, respectively. The sandy loam soil was 67.8% sand, 23.0% silt and 9.2% clay, with 1.4% organic matter and 8.2 pH. The soil was dry to 2 inches, with intermediate moisture in the root zone deeper than 2 inches. Fall-germinated volunteer wheat was in the 2 to 3-leaf stage and 3 to 6 inches tall when herbicides were applied. Precipitation during April, May and June was more frequent and in greater quantity than is normal for the time period.

Control, height and chlorosis of volunteer wheat were evaluated visually on May 27, 1981, 44 days after herbicides were applied. An effect from paraquat, which was added to each herbicide-water solution, was not observed on volunteer wheat in any plot; all phytotoxicity appeared to result from absorption of herbicide(s) by roots. Atrazine, alone or in combination with cyanazine or metribuzin, as well as metribuzin in combination with cyanazine or terbutryn, were treatments that resulted in a comparatively high degree of volunteer wheat control. These treatments generally caused the greatest suppression of height and the most severe chlorosis.

A second evaluation for volunteer wheat control was made on June 30, 1981, 78 days after herbicide application. Treatments that provided good control one month earlier continued to be effective. Treatments that showed marked improvement of performance at the later evaluation date were atrazine alone, hexazinone + diuron, chlorsulfuron + hexazinone, terbutryn + atrazine, and metribuzin + atrazine, cyanazine or terbutryn. Apparent antagonism was observed where chlorsulfuron was tank-mixed with cyanazine or terbutryn; similarly, an increased amount of chlorsulfuron, when tank-mixed with hexazinone, resulted in markedly less control of volunteer wheat. Terbutryn alone was decidedly superior to tank-mixed terbutryn + cyanazine. The nature of the apparent antagonism and the role of paraquat could not be assessed in this experiment. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1138)

Early-spring herbicide treatments
for controlling fallow-season volunteer winter wheat

Herbicides[1]	Rate lb/A	Volunteer Wheat[2] Percent Control May 27	June 30	Height in	Chlorosis 0-10
atrazine	0.5	67	93	14	6
cyanazine + atrazine	1.06 + 0.54	95	92	7	7
hexazinone + diuron	0.225 + 0.8	70	96	12	7
chlorsulfuron + hexazinone	0.016 + 0.225	18	87	17	3
chlorsulfuron + hexazinone	0.031 + 0.225	17	60	14	3
chlorsulfuron + cyanazine	0.016 + 1.5	15	17	14	3
chlorsulfuron + cyanazine	0.031 + 1.5	18	27	13	4
metribuzin	0.38	33	33	15	3
metribuzin	0.5	27	37	15	3
metribuzin + atrazine	0.38 + 0.5	63	99	12	7
metribuzin + atrazine	0.5 + 0.5	80	98	9	7
metribuzin + cyanazine	0.5 + 1.5	70	90	10	7
metribuzin + terbutryn	0.5 + 1.5	80	83	10	7
terbutryn	1.5	77	78	10	7
terbutryn + atrazine	1.5 + 0.5	33	82	13	5
terbutryn + chlorsulfuron	1.5 + 0.016	20	13	14	4
terbutryn + chlorsulfuron	1.5 + 0.031	7	7	16	3
terbutryn + cyanazine	1.25 + 1.25	25	23	17	3
terbutryn + cyanazine	1.5 + 1.5	20	17	13	2
terbutryn + cyanazine	2.0 + 2.0	27	27	13	3
terbutryn + metribuzin	1.5 + 0.38	82	88	11	7
Check (no treatment)	---	0	0	14	4
plants/sq ft		*9.9*			

[1]Herbicides were applied April 13, 1981. Paraquat was tank-mixed with each herbicide solution at 0.5 lb/A.
[2]Visual evaluations for volunteer wheat control. Height and chlorosis evaluations were made May 27, 1981. Chlorosis rating: 0 = none; 10 = no green color.

Mid-spring herbicide treatments for fallow period control of volunteer wheat in Wyoming. Humburg, N. E. and H. P. Alley. The study was established to determine the activity of herbicide combinations for controlling volunteer wheat during the fallow summer season prior to planting winter wheat. Plots were located in southeastern Wyoming, near Chugwater. Tank-mixed herbicides were applied to one-square-rod plots in three randomized complete blocks. A hand-carried, 6-nozzle-boom sprayer with CO_2 propellant was used to apply 40 gpa herbicide-water solution. Herbicides were applied between 9:05 and 9:45 a.m. on May 11, 1981. Ninety percent of the soil surface area in undisturbed stubble was dry to 0.5-inch depth; beneath 0.5 inch soil was at field capacity. Volunteer wheat development ranged from 0 to 12 tillers with culms jointing, 2 to 5 leaves and 5 to 16-inch height. Weather at the time of herbicide application was: air temperature, 54 F; relative humidity, 53%; wind 3 to 6 mph; the sky was party cloudy; and soil temperatures were 61, 60, 49 and 46 F for the surface and depths of 1, 2 and 4 inches, respectively. Light rain occurred 3 to 4 hr after herbicide application. The soil was sandy loam (65.8% sand, 23.4% silt and 10.8% clay) with 7.7 pH and 1.4% organic matter.

Plots were evaluated on June 8, 1981, 31 days after treatment, by visually estimating percentage control, average height and chlorosis of volunteer wheat. Mixtures containing metribuzin, metribuzin + cyanazine, and hexazinone + diuron provided control of volunteer wheat ranging from 78 to 96%. Height of volunteer wheat in untreated check plots averaged 22 inches, whereas in plots treated with metribuzin + cyanazine + paraquat the range in height was 7 to 9 inches, and for hexazinone + diuron treatments the height was 12 to 13 inches. PPG-844 at 0.5, 1.0 and 2.0 lb/A, each with paraquat at 0.5 lb/A, provided relatively little control of volunteer wheat, but caused stunting; plants were 12 to 13 inches tall. All herbicide treatments reduced the height of volunteer wheat. All wheat was chlorotic, including that in the untreated check. Treatments with metribuzin + paraquat and metribuzin + cyanazine + paraquat resulted in the greatest chlorosis; metribuzin + terbutryn caused less injury to volunteer wheat than metribuzin + cyanazine + paraquat at comparable rates. Rainfall received during the month following herbicide application was more frequent and greater than normal for that time of year.

Visual evaluations on June 30, 1981, indicated that most treatments gave better control of volunteer wheat 50 days after application of herbicides than after 31 days. Treatments that were highly effective after 31 days remained effective after 50 days. Substantial improvement in control was observed on plots treated with chlorsulfuron + hexazinone, hexazinone + diuron and metribuzin + terbutryn. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1139)

Mid-spring herbicide treatments for fallow-period control of volunteer wheat in Wyoming

Herbicides[1]	Rate lb/A	Volunteer Wheat[2] Control, % June 8	June 30	Height in	Chlor-osis 0-10
chlorsulfuron + paraquat	0.0625 + 0.5	30	27	15	2
chlorsulfuron + hexazinone	0.031 + 0.225	23	93	19	4
DPX-5648 + paraquat	0.0156 + 0.5	7	10	11	4
DPX-5648 + chlorsulfuron	0.0078 + 0.0156	0	3	17	2
DPX-5648 + chlorsulfuron	0.0078 + 0.031	0	10	13	4
hexazinone + diuron	0.225 + 1.2	78	99	12	6
hexazinone + diuron	0.225 + 1.6	78	99	13	5
metribuzin + cyanazine + paraquat	0.38 + 1.5 + 0.5	96	98	8	8
metribuzin + cyanazine + paraquat	0.38 + 2.0 + 0.5	91	98	9	8
metribuzin + cyanazine + paraquat	0.5 + 1.5 + 0.5	93	98	7	8
metribuzin + cyanazine + paraquat	0.625 + 1.5 + 0.5	88	96	9	8
metribuzin + paraquat	0.75 + 0.25	86	96	11	8
metribuzin + terbutryn	0.38 + 2.0	60	92	11	4
metribuzin + terbutryn	0.5 + 1.5	43	92	15	4
PPG-844 + paraquat	0.5 + 0.5	23	20	13	2
PPG-844 + paraquat	1.0 + 0.5	23	23	13	4
PPG-844 + paraquat	2.0 + 0.5	33	43	11	4
Check (no treatment)	---	0	0	22	2
plants/sq ft		*5.3*			

[1]Herbicides were applied May 11, 1981. Wetting agent (X-77) was added at 0.125% v/v to each herbicide-water solution.
[2]Visual evaluations for volunteer wheat control. Height and chlorosis evaluations were made June 8, 1981. Chlorosis rating: 0 = none; 10 = no green color.

Rapid response to herbicides applied to stubble immediately after harvest of dryland winter wheat. Humburg, N. E. and H. P. Alley. Delay in application of herbicides allows volunteer wheat and weeds to germinate and grow in harvested wheat fields with few restrictive factors. Established weeds are generally difficult to control when soil-active herbicides are in a zone above that of roots. Incorporation by rainfall permits herbicides to be accessible to germinating seed and seedling plants. An experiment was established in southeastern Wyoming for fallow-season vegetation control in a wheat-fallow-wheat rotation. Herbicides were applied immediately after dryland winter wheat was harvested to assess the performance of various treatments without the addition of paraquat or glyphosate. Plots of 1 sq rod area were arranged in three randomized complete blocks. Herbicide-water solutions were applied with a hand-carried sprayer with a 6-nozzle boom; the broadcast delivery rate was 40 gpa. When herbicides were applied on July 29, 1981, 95% of the surface soil area was dry. Weather conditions were: air temperature, 76 F; relative humidity, 57%; wind 0 to 3 mph; sky clear to partly cloudy. Soil temperatures for the surface and depths of 1, 2 and 4 inches were 82, 77, 74 and 73 F, respectively. The sandy loam soil (79.0% sand, 10.8% silt and 10.2% clay) had 1.0% organic matter and 6.3 pH. Sparse stands of weeds that were established in the wheat crop were present when herbicides were applied; species and range of heights were as follows: Russian thistle, 3 to 6 inches; slimleaf lambsquarters, 4 to 7 inches; and cutleaf nightshade, 2 to 4 inches.

Visual evaluations of the control of volunteer wheat and four broadleaf weed species were made on August 20, 1981, 22 days after herbicide application. Adequate rainfall was received after application to incorporate root-absorbed herbicides into the surface soil. Herbicide combinations that provided good control of slimleaf lambsquarters, Russian thistle, cutleaf nightshade and erect knotweed were cyanazine + atrazine, chlorsulfuron + atrazine, chlorsulfuron + cyanazine, chlorsulfuron + terbutryn, terbutryn + atrazine, and metribuzin + atrazine. No herbicide or herbicide combination totally controlled volunteer wheat; combinations with cyanazine were among the better treatments. Control of slimleaf lambsquarters and Russian thistle was markedly less than other treatments where atrazine alone, bifenox alone, or acetochlor + glyphosate were applied. Chlorsulfuron, chlorsulfuron + glyphosate, chlorsulfuron + EL-187, chlorsulfuron + metribuzin, bifenox and metribuzin did not control cutleaf nightshade. Volunteer wheat exhibited tolerance to atrazine, chlorsulfuron, bifenox and metribuzin. (Wyoming Agric. Exp. Sta., Laramie 82071, SR 1137)

Rapid response to herbicides applied to stubble immediately after harvest of dryland winter wheat

Herbicide[1]	Rate lb/A	Percent Control[2] LQ	RT	NS	KW	VOL WHT
atrazine	0.5	43	23	100	57	13
atrazine	0.8	73	43	97	40	50
cyanazine + atrazine	1.6 + 0.5	100	96	100	90	70
cyanazine + atrazine	1.6 + 0.8	100	98	100	98	85
chlorsulfuron	0.031	95	99	0	87	0
chlorsulfuron	0.062	98	99	0	77	17
chlorsulfuron + glyphosate	0.031 + 0.38	96	99	3	97	33
chlorsulfuron + glyphosate	0.062 + 0.38	99	100	7	100	3
chlorsulfuron + atrazine	0.031 + 0.5	99	100	100	97	33
chlorsulfuron + atrazine	0.062 + 0.5	99	100	43	97	40
chlorsulfuron + cyanazine	0.031 + 1.0	98	99	100	92	73
chlorsulfuron + cyanazine	0.062 + 1.0	100	100	100	95	88
chlorsulfuron + EL-187	0.031 + 0.3	97	100	43	88	60
chlorsulfuron + EL-187	0.062 + 0.3	99	100	33	97	37
chlorsulfuron + terbutryn	0.031 + 2.0	100	100	100	99	40
chlorsulfuron + terbutryn	0.062 + 2.0	99	100	100	93	60
chlorsulfuron + metribuzin	0.031 + 0.75	96	100	33	100	60
chlorsulfuron + metribuzin	0.062 + 0.75	100	100	13	90	60
terbutryn + atrazine	2.0 + 0.5	100	100	100	100	77
MC-10108	0.75	96	99	67	70	48
MC-10108	1.0	99	98	97	60	63
MC-10108 + atrazine	0.75 + 0.5	100	100	100	58	40
bifenox	1.0	17	17	27	7	33
bifenox + atrazine	1.0 + 0.5	77	67	100	70	37
acetochlor + glyphosate	4.0 + 0.38	43	20	70	53	70
metribuzin	0.5	90	33	0	100	17
metribuzin	0.75	93	57	67	77	53
metribuzin + atrazine	0.5 + 0.5	97	70	100	100	37
metribuzin + atrazine	0.75 + 0.5	99	87	73	100	73
Check	---	0	0	0	0	0
plants/sq ft		*0.7*	*0.7*	*0.3*	*0.2*	*0.6*

[1]Herbicides were applied July 29, 1981. Wetting agent (X-77) was added at 0.125% v/v to each herbicide-water solution.

[1]Visual evaluations were made on August 20, 1981. Abbreviations: LQ = slimleaf lambsquarters; RT = Russian thistle; NS = cutleaf nightshade; KW = erect knotweed; VOL WHT = volunteer wheat.

Weed control in chemical fallow with fall applied herbicides. Lish, J. M., D. C. Thill and R. H. Callihan. An experiment was established at Lewiston, Idaho to evaluate weed control with herbicide in chemical fallow. Fall treatments were applied on November 18, 1980 with a backpack sprayer equipped with a three nozzle boom calibrated to deliver 147 l/ha at 28 kg/cm^2 pressure from a CO_2 source. Glyphosate was applied on March 28, 1981. Soil temperature at 15 cm and air temperature was 7 and 9 C in the fall and 14 and 22 C in the spring, respectively. The experimental design was a randomized complete block with four replications. Grass weed control was evaluated on April 27 and May 27, 1981 and broadleaf weed control was evaluated on July 1, 1981.

Cyanazine + atrazine + glyphosate completely controlled volunteer wheat and downy brome. Clasping pepperweed was controlled with most of the herbicides, however, propham gave no control and decreased the effectiveness of chlorsulfuron. Cyanazine + atrazine and PPG-844 completely controlled prickly lettuce. Propham decreased the effectiveness of PPG-844 on broadleaves when the tank mixture was applied. Broadleaf weed control with metribuzin was also reduced when tank-mixed with propham. The grass was controlled in plots treated with propham, therefore competition was reduced for broadleaf weeds. Grass stands possibly helped suppress broadleaf weeds where propham was not applied. Russian thistle was completely controlled with metribuzin at 0.28 kg/ha, chlorsulfuron, chlorsulfuron + propham and PPG-844. (Idaho Agriculture Experiment Station, Moscow, Idaho 83843).

Weed control with fall applied herbicides in chemical fallow.

Treatment	Rate	Weed Control				
		Grass[1]		Broadleaf[2]		
		April 27	May 27	Prle	Clpw	Ruth
	(kg/ha)	---------------	---------------	%	---------------	---------------
metribuzin	0.28	16	18	75	100	100
metribuzin	0.57	55	77	52	100	45
propham[3]	3.36	74	65	0	0	45
propham + metribuzin	3.36+0.28	72	85	0	78	52
cyanazine	3.36	71	70	90	75	78
cyanazine + atrazine	3.36+0.28	96	94	100	100	78
chlorsulfuron	0.07	35	14	98	100	100
propham + chlorsulfuron	3.36+0.07	84	88	80	58	100
cyanazine + atrazine + glyphosate	3.36+0.28+ 0.42	99	100	100	100	96
cyanazine + dalapon	1.12+3.36	62	52	82	95	75
propham + 2,4-D	3.36+0.84	68	46	32	55	72
glyphosate	0.42	90	74	60	100	50
PPG-844 + propham	1.12+3.36	88	72	22	100	50
PPG-844	0.57	21	2	100	100	100
PPG-844	1.12	50	44	100	100	100
PPG-844 + propham	0.57+3.36	87	85	68	75	60
check	-	0	0	0	0	0
$LSD_{0.05}$		35	28	35	32	48

[1] Grasses evaluated were % volunteer wheat and % downy brome

[2] Evaluated July 1

[3] Propham containing PCMC

Chemical fallow herbicide trial in wheat stubble using mixtures of glyphosate and dicamba. Rydrych, D.J. A field trial in wheat stubble was established on the Pendleton Station in the spring of 1981 to evaluate mixtures of glyphosate and dicamba that could be used for broad spectrum vegetation control in wheat stubble. Chemical fallow herbicides are used in eastern Oregon stubble fields to control volunteer cereals, grass weeds, and broadleaf weeds. The use of a chemical fallow herbicide can reduce tillage operations and help conserve soil moisture during the fallow year.

Glyphosate at .25 lb/A and dicamba at .25 lb/A gave excellent grass and broadleaf weed control in the stubble. The mixtures were applied February 26, 1981 on a Walla Walla silt loam soil containing 1.9% OM. in wheat stubble containing volunteer wheat, downy brome, and broadleaf weeds such as henbit, prickly lettuce, prostrate knotweed, and blue mustard. The trial was evaluated May, 1981 and the results are recorded in the table.

Glyphosate-dicamba mixtures at low rates gave excellent control of vegetation and weeds in wheat stubble at rates that are highly economical. (OSU - Columbia Basin Agricultural Research Center, Pendleton Station, Pendleton, OR 97801).

Spring chemical fallow treatments using dicamba and glyphosate treatment in wheat stubble. Pendleton, Oregon

Treatment[1]	Rate lb/A	Volunteer wheat control %	Downy brome control %	Broadleaf[2] control %
glyphosate + dicamba	.25 + .25	99	99	95 K,PL,BM
glyphosate + dicamba	.33 + .33	99	100	98 K,PL
glyphosate + dicamba	.50 + .50	100	100	99 PL
Control		0	0	0 K,PL,BM,H

[1]Treatment - February 26, 1981 in stubble

[2]Abbreviations: K = prostrate knotweed, PL = prickly lettuce, BM = blue mustard, H = henbit

The effect of different application equipment on the control of Canada thistle. Schumacher, W. J., D. C. Thill, and R. H. Callihan. This study was initiated at Tensed, Idaho to evaluate the use of different applicators for effective Canada thistle control. The applicators consisted of 2 ropewicks (McGregor and Rears), a canvas wick, a Herbi (modified to spray under a low pressure condition), and a CO_2 backpack sprayer calibrated to deliver 187 l/ha at 2.8 kg/cm^2 boom pressure. All treatments were applied on July 23, 1981 when the Canada thistle was in the early bud stage of development. Air temperature was 21.6 C, soil temperature was 23.3 C at 15 cm, and the relative humidity was 73%. The experimental design was a randomized complete block with 4 replications. Each plot measured 3 x 10 m in size. Visual Canada thistle control was obtained on August 12 and September 11, 1981. The plants ranged in size from 0.6 to 1.5 m in height.

Of the applicators tested, the modified herbi applying a 25% solution of glyphosate and the broadcast application (CO_2 backpack) of glyphosate + dicamba at 0.76 + 1.12 kg/ha provided the greatest control of Canada thistle on both observation dates (see table). The application of glyphosate + dicamba in a 33% solution through the canvas wick resulted in little or no-control of Canada thistle. (Idaho Agricultural Experiment Station, Moscow, Idaho 83843).

Canada thistle control using various types of herbicide applicators.

Treatment	Rate	Type of Application	Canada Thistle Control 8/12/81 Tall 1/	Canada Thistle Control 8/12/81 Short 2/	Canada Thistle Control 9/11/81
			(%)	(%)	(%)
glyphosate	33% soln.	Ropewick-McGregor	79 a[3]	20 d	76 abc
glyphosate	33% soln.	Canvas-wick	58 b	20 d	80 ab
glyphosate	33% soln.	Ropewick-Rears	60 b	18 d	68 bc
glyphosate	33% soln.	Modified Herbi	95 a	88 a	88 a
dicamba + X-77	1.12 kg/ha + 0.5% v/v	Broadcast	38 cd	43 c	43 d
dicamba + X-77	2.24 kg/ha + 0.5% v/v	Broadcast	55 b	50 bc	50 d
dicamba + 2,4-D + X-77	1.56 + 0.56 kg/ha + 0.5% v/v	Broadcast	46 bc	38 c	45 d
MCPA	3.36 kg/ha	Broadcast	38 cd	38 c	38 d
glyphosate + dicamba	33% soln.	Canvas wick	0 e	1 e	9 e
dicamba	33% soln.	Canvas wick	23 d	23 d	50 d
glyphosate	1.56 kg/ha	Broadcast	95 a	63 b	65 c
glyphosate + dicamba	0.76 + 1.12 kg/ha	Broadcast	95 a	85 a	85 a

1/ Plants that ranged from 1 to 1.5 m in height

2/ Plants that ranged from 0.5 to 1 m in height

3/ Means followed by the same letter(s) are not significantly different at the 0.05 level of probability according to Duncan's multiple range test.

PROJECT 6

AQUATIC, DITCH, AND NON-CROP WEEDS

Floyd Colbert - Project Chairman

Control of hydrilla in irrigation canals with acrolein. Anderson, L. W. J. and N. Dechoretz. A field study was conducted to determine the effects of acrolein on hydrilla and the fate of the herbicide in irrigation canals of the Imperial Irrigation District. Two canals were treated with 8.0 ppmw for four hours and two were treated at 14 ppmw for one hour. Effects of acrolein were determined by sampling the biomass at different locations in the canal prior to treatment and one, two, four and eight weeks after treatment. Treated water in three of the four canals was sampled at various points downstream from the application site to determine the concentration of acrolein as the water moves downstream.

Almost complete control of hydrilla was obtained in all the canals treated with acrolein. However, significant amounts of regrowth occurred in three of the canals within four weeks after treatment. Four weeks after treatment, the biomass (g/m^2 fr. wt.) in two of the canals was approximately 50% of the amount present before treatment.

Due to unexpected high water flow, the actual average maximum concentration of acrolein was approximately 25% and 50% less than the nominal 8 ppm treatment, (see table). The average maximum concentration of acrolein in the canal treated nominally at 14 ppmw was very close to the expected value. The level of acrolein in all three canals decreased very quickly. One mile downstream from the application site, the maximum concentration of acrolein decreased by an average of 28%. In canals longer than one mile, the maximum concentration of acrolein in water two miles downstream was reduced by approximately 70%. (U.S.D.A. Aquatic Weed Control Research, Botany Department, University of California, Davis, CA 95616).

Maximum concentration and percent loss of acrolein in three canals located in the Imperial irrigation district

Canal	Sample site no.	Distance from injection (mi)	Average maximum conc. (ppmw)	Percent decrease
flax	1	.05	4.38	--
	2	1.0	3.33	24.0
	3	1.5	2.15	50.9
	4	2.3	1.49	66.0
woodbine lateral 3	1	.05	13.25	--
	2	0.4	11.00	17.0
	3	0.8	9.80	26.0
wisteria lateral 6	1	.05	6.27	--
	2	1.0	4.11	34.4
	3	1.9	1.71	72.7

Evaluation of PH4062 for the control of filamentous algal. Anderson, L. W. J. and N. Dechoretz. Greenhouse studies were conducted to compare the effects of PH4062 with $CuSO_4$ on Cladophora and Rhizoclanium under static water conditions. Assays for algicidal activity were made by placing 1g of damp-dried algal in jars containing 3ℓ of tap water. Twenty-four hours later, the algicides were added to the jar and then the water was gently stirred to insure even distribution of the chemical. After one week, algae were removed from the jars, damp-dried, placed in a drying oven for 24 hours and then weighed.

Results are shown in the following table. The dry weight of both species in the untreated jars increased significantly over the one period. The growth of both species decreased as the algicide concentration increased. Furthermore, based on dry wieght, PH4062 appears to be only slightly more toxic to both species than $CuSO_4$.

The response of the algae in these tests were interesting. Two days after treatment, both species of algae treated with PH4062 at 0.25 ppmw and above slumped to the bottom of the jars. In addition, algae treated at 0.50 and 1.0 ppmw turned yellow prior to slumping. $CuSO_4$ did not induce a similar response until four to five days after treatment.

Some selectivity has been observed in tests with Chara sp. At low concentrations of PH4062 (eg. .25, .5ppmw) Chara is generally unaffected while growth of filamentous algae is reduced at these concentrations. Chara sp. did become slightly chlorotic after one week exposure to PH4062 at 1.0 ppmw.

Bioassays conducted with Rhizoclonium sp. and Cladophora sp. (probably C. glomerata) showed that PH4062 loses phytotoxicity to these species within about seven days after 0.5ppmw treatments in one gallon jars. Loss of phytotoxicity was more rapid when jars contained soil. (U.S.D.A. Aquatic Weed Control Research, Botany Department, University of California, Davis, CA 95616).

Response of Rhizoclonium and Cladophora to PH4062 and $CuSO_4$ one week after treatment

algicide	treatment rate in ppmw	dry wt. of algae (g)	
		Cladophora[a/]	Rhizoclonium[b/]
control	0	.44[c/]	.49
$CuSO_4$	0.10[d/]	.36	.38
	0.25	.27	.27
	0.50	.22	.20
	1.00	.22	.18
PH4062	0.10	.39	.35
	0.25	.27	.26
	0.50	.19	.14
	1.00	.17	.12

a/ Initial dry weight of algae = .22±.01; average of six replicates.

b/ Initial dry weight of algae = .23±.03; average of six replicates.

c/ Average of three replicates.

d/ Concentration expressed as ppmw copper ion.

Use of hydrilla explant bioassay to determine effects of light on fluridone, (Sonar[R]), phytotoxicity and effects of chlorsulfuron (formerly DPX4189). Anderson, L. W. J. Apical tips (4cm long) and sections of shoots containing two intact nodes (with intact whorls of leaves) were excised from healthy *Hydrilla verticillata* and exposed to 0.25ppmw fluridone in 1% sterile Hoaglands medium in 500 ml Erlenmyer flasks. Explants were maintained in a growth chamber at 24±1 C under 12 h. days but light intensity was varied via shade cloth to give 10, 60, 135 μ E m^{-2} sec^{-1}, or was totally restricted in a light-tight box. Exposure to 1, 5 or 10 ppbw chlorsulfuron were similar but all plants were under 135 μ E m^{-2} sec^{-1}. Results are given in Tables 1 and 2. Fluridone had little effect on elongation of cut apices although those under 60 μ E m^{-2} sec^{-1}, appeared to be slightly longer than controls ($\sim$ .5cm longer). Controls elongated most ($\sim$ 1.8 cm in 7 days) under 60 μ E m^{-2} sec^{-1} though differences were slight. The 2-node explants produced more new shoots at higher light levels and almost none when in the dark. Fluridone did not inhibit new shoot production, but those that were produced under 60, and 135 μ E m^{-2} sec^{-1} were chlorotic. The growth on apices exposed to fluridone were also chlorotic, but only slight chlorosis was observed in those grown under 10 μ E m^{-2} sec^{-1}. After 11 days, the terminal 2 cm of the apical explants were removed and analysed for chlorophyll-a. Control and fluridone treated apices kept in dark contained $\sim$.38 mg/g fr. wt., whereas controls under 60 μ E m^{-2} sec^{-1} had 1.39 mg/g and those treated with fluridone had only $\sim$0.41 mg/g. Plants exposed to fluridone had more chlorophyll under low light (10 μ E m^{-2} sec^{-1}) than under no light or 60 or 135 μ E m^{-2} sec^{-1}. These results show that light is required for fluridone-caused chlorosis in *Hydrilla*.

Chlorsulfuron caused slightly inhibited elongation of apical explants at 5ppbw but greatly inhibited elongation of newly initiated axial shoots on 2-node explants. Untreated nodal explants had new shoot lengths of $\sim$1.18 cm after 14 days compared to $\sim$0.21 cm for those treated with 1, 5 or 10ppbw chlorsulfuron. Chlorsulfuron appeared to stimulate production of new axial shoots on apical explants, perhaps as a result of stunting elongation. These results demonstrated the feasibility of using hydrilla explants for bioassays so that (1) more physiologically uniform plant material can be tested and (2) smaller volumes of growth medin (200-300 ml) can be used. Results also suggest that hydrilla exhibits typical apical dominance in which axial bud initiation below (proximal to) the apical meristem is inhibited but can be released by removal (excision) of distal meristem. (USDA Aquatic Weed Control Research, Botany Department, University of California, Davis, CA 95616).

Table 1. Effect of 0.25 ppmw fluridone on apical meristems of *Hydrilla verticillata*[1/]

Light exposure ($\mu Em^{-2}\ sec^{-1}$)	length (cm)[2/] Control	length (cm)[2/] Fluridone	% new buds (apical meristem) Control	% new buds (apical meristem) Fluridone	% new buds (2-node sections) Control	% new buds (2-node sections) Fluridone	Chlorophyll a[3/] mg/g fr. wt. Control	Chlorophyll a[3/] mg/g fr. wt. Fluridone
0 (7)	5.8 ±.67	4.86±.2	0	0	1.75±1.9	0		
(11)	4.6 ±.17	5.2 ±.23	3.3±3.4	0	3.0 ±2.4	5.0±2.8	.382±.06	.386±.03
					2.5 ±2.5	5.0±2.9		
10 (7)	5.29±.28	6.37±.44	6.7±3.4	10.0±5.9	7.5 ±2.5	7.5±4.8		
(11)	5.49±.34	6.6 ±.48	4.3±2.9	6.7±6.8	15.0 ±2.9	17.5±2.5	.867±.05	.542±.05
					7.5 ±2.5	20.0±4.1		
60 (7)	5.87±.29	5.7 ±.35	10.0± 10.0	16.7±3.4	35.0 ±2.8	10.0±7.1		
(11)	5.8 ±.33	5.56±.35	16.7±6.8	30.0±15.6	31.5 ±2.5	22.5±8.5	1.392±.38	.409±.06
					35.0 ±2.9	32.0±8.5		
135 (7)	5.2 ±.19	5.59±.21	16.7±3.3	10.0±5.8	25.0 ±6.4	30.0±14.7		
(11)	5.4 ±.2	5.7 ±.21	20.0±5.9	10.3±5.6	27.8 ±8.4	35.0±17.6	.778±.07	.337±.04
					27.5 ±4.8	32.5±16.0		

1/ Values are from thirty meristems or thirty 2-node sections.
2/ Starting length = 4.0 cm; numbers in parentheses are days posttreatment.
3/ Values are means ± S.E. from 15 2-cm Apical tips.

Table 2. Effect of DPX 4189 (chlorsulfuron) On Growth of Hydrilla verticillata Apical Meristems and 2-Node Sections[1/]

	Apical Meristems			2-Node Section	
Treatment	length (cm)	% N.W. Stems	Length New Stems (cm)	Length New Stems (cm)	% N.W. Stems
Control					
(7)[2/]	5.8 ±0.13	0	---	---	16.7± 3.4
(10)	---	---	---	0.91±0.03	30.0±10.2
(14)	5.8 ±0.13	66.6± 3.7	0.35±.11	1.18±0.15	30.0±10.2
1 ppb					
(7)	5.7 ±0.10	3.3± 3.4	---	---	30.0±17.6
(10)	---	---	---	0.21± .06	46.6±14.8
(14)	5.86±0.12	76.7±13.6	0.31±.08	0.24± .07	43.3±14.8
5 ppb					
(7)	5.3 ±0.1	13.3± 6.8	---	---	23.3± 6.8
(10)	---	---	---	0.24± .09	36.7± 5.9
(14)	5.56±0.13	53.3± 6.8	0.32±.12	0.21± .09	33.3± 3.4
10 ppb					
(7)	5.48±1.10	10.0± 5.9	---	---	16.7± 3.4
(10)	---	---	---	0.19±1.06	36.7± 9.0
(14)	5.49±0.14	63.3±12.2	0.18±.04	0.19± .08	36.6± 8.9

1/ Values are mean ± S.E. for thirty apices or thirty 2-node sections, ten per replicate. All apices were 4 cm at start of treatment.

2/ Numbers in parentheses are days posttreatment.

Concentration of copper in hydrilla 24 hours after an application of Komeen to Sheldon Reservoir. Anderson, L. W. J. and N. Dechoretz. Applications of Komeen under static water conditions have provided excellent control of hydrilla in the Imperial Irrigation System. A field study was initiated to determine the level of copper in hydrilla 24 hours after an application of Komeen. Sheldon Reservoir (56 acres) was treated with Komeen at a rate of (8 gal/ac. Twenty plant samples were collected before and 24 hours after treatment in two locations of the reservoir. Each group of 20 plants were divided up at random into subgroups of 10 plants each. Plants in one subgroup were washed prior to analysis for copper to remove material absorbed to the surface of the plant. Plants in the second subgroup were not washed prior to copper analysis.

Results are presented in the accompanying table. The uptake of copper by hydrilla and by the material absorbed on the plant surface was quite dramatic. The copper content of unwashed and washed plants sample before treatment ranged from 28.4 to 46.3 ppmw. Twenty-four hours later, the average copper content in hydrilla increased to a high of approximately 2,100 ppm. The initial copper level in material absorbed on the plants was approximately four times higher than the copper content in hydrilla. However, the copper concentration in the absorbed material 24 hours after treatment was only slightly higher than the copper concentration in hydrilla.

Copper content of hydrilla in Sheldon Reservoir after an application of Komeen

Copper concentration (ppmw) ± standard error

Location	Unwashed Plants	Washed Plants	Absorbed Material	Unwashed Plants	Washed Plants	Absorbed Material
1	28.4±1.9 [1/]	31.6±3.4	144.0±22.6	1648.7±90.4	2131.7±740.0	3124.6±596.3
2	46.3±3.2	37.1±2.4	178.7±76.8	1400.5±53.3	2103 ±656.6	1780.8±226.9

1/ Average of ten plants per location.

Response of sago pondweed to chlorsulfuron and DPX5648. Dechoretz, N. and L. W. J. Anderson. Greenhouse tests were conducted to evaluate the response of sago pondweed to chlorsulfuron and DPX5648 when applied to water as a preemergence treatment. Assays for phytotoxicity were made by placing two small pots containing tubers of sago pondweed in 20 ℓ of water containing the herbicide. Each treatment was replicated four times. The degree of phytotoxicity was based on length, fresh weight and dry weight of plants in jars four weeks after treatment.

Chlorsulfuron and DPX5648 applied at 1.0 ppb significantly reduced the growth of and development of sago pondweed. According to studies by other research workers, both compounds inhibit its cell division. Length of sago pondweed in jars treated with chlorsulfuron or DPX5648 at 1.0 ppb was reduced by 82.4 and 89.2%, respectively.

Generally, DPX5648 was slightly more phytotoxic than chlorsulfuron. For example, the fresh and dry weight of sago pondweed in jars treated with chlorsulfuron at 1.0 ppb was reduced by 75.3 and 69.8%. In contrast, fresh and dry weight of sago pondweed in jars treated with DPX5648 at 1.0 ppb was reduced by 86.1 and 82.7%. (USDA Aquatic Weed Control Research, Botany Department, University of California, Davis, CA 95616)

Effect of chlorsulfuron and DPX5648 on sago pondweed

Treatment rate (ppb)	Plant response[1/]					
	Length(cm)		Fresh weight(g)		Dry weight(g)	
	Chlorsulfuron	DPX5648	Chlorsulfuron	DPX5648	Chlorsulfuron	DPX5648
0	61.3±3.8	40.7±3.1	8.80±.62	7.65±.98	1.19±.09	0.92±.13
1	10.8±1.9	4.4±0.5	2.18±.18	1.07±.08	0.36±.04	0.16±.01
5	6.6±0.3	3.1±0.2	1.57±.13	0.66±.08	0.27±.02	0.11±.02
10	5.8±0.3	3.2±0.3	1.14±.17	0.45±.07	0.16±.02	0.07±.01
50	5.1±0.3	3.4±0.3	0.77±.06	0.40±.05	0.12±.01	0.06±.01

1/ Value represents mean ± standard error.

Response of Cladophora sp. and Rhizoclonium sp. treated with PH4062 at various concentrations and exposure periods. Dechoretz, N. and L. W. J. Anderson. Tests were conducted under greenhouse conditions to compare the response of Rhizoclonium and Cladophora to PH4062 and $CuSO_4$ when treated with different concentrations over a range of exposure or contact times. Algae was placed in jars containing 3ℓ of water for 24 hours and then treated with PH4062 or $CuSO_4$ at 1.0, 2.0 or 4.0 ppmw. Algae was left in treated water for one, two and four hours. After each exposure, the algae was removed from the treated jars, placed in a running bath of water for 30 minutes, and then placed in jars containing 3ℓ of fresh water.

Growth of Cladophora was inhibited after the algae was exposed for two or more hours to 2.0 ppmw PH4062, (see table). Exposure periods of one hour or more at 4.0 ppmw PH4062 provided excellent control one week after treatment. In contrast, exposure periods of two or four hours were required to inhibit the growth of Cladophora treated with $CuSO_4$ at 4.0 ppmw.

Rhizoclonium was more susceptible to PH4062 and $CuSO_4$ than Cladophora. The growth of this species was inhibited considerably after the algae was exposed for two hours to 1.0 ppmw PH4062 or $CuSO_4$ at 4.0 ppmw. At 4.0 ppmw, PH4062 was nearly twice as effective as $CuSO_4$ in reducing growth (measured by dry wt.) of Rhizoclonium. (U.S.D.A. Aquatic Weed Control Research, Botany Department, University of California, Davis, CA 95616)

RESPONSE OF CLADOPHORA AND RHIZOCLONIUM TO VARIOUS EXPOSURE PERIODS AND CONCENTRATION OF PH4062 AND $CuSO_4$ ONE WEEK AFTER TREATMENT

Treatment Rate in ppm	Exposure period (hr)	Dry Wt. of Algae: Cladophora[a/] PH4062	Cladophora[a/] $CuSO_4$	Rhizoclonium PH4062	Rhizoclonium $CuSO_4$
Control	1	.43±.03[c/]		.44±.08	
	2	.49±.03		.45±.08	
	4	.43±.03		.45±.06	
1.0[d/]	1	.34±.03(79)	.44±.09(102)	.40±.10(91)	.39±.07(88)
	2	.35±.08(71)	.41±.08(84)	.25±.08(55)	.26±.01(58)
	4	.30±.05(69)	.39±.06(91)	.25±.01(55)	.29±.03(64)
2.0	1	.32±.08(75)	.38±.05(88)	.26±.03(59)	.24±.05(55)
	2	.16±.02(32)	.30±.09(61)	.21±.06(47)	.22±.02(49)
	4	.17±.03(39)	.31±.05(71)	.14±.03(32)	.24±.03(53)
4.0	1	.19±.04(43)	.32±.05(75)	.19±.03(44)	.30±.03(67)
	2	.07±.01(15)	.24±.04(50)	.10±.02(21)	.20±.01(44)
	4	.16±.03(37)	.22±.04(51)	.11±.05(24)	21±.04(47)

a/ Initial weight = .22±.02; average of six replicates

b/ Initial weight = .23±.03; average of six replicates

c/ Average of three replicates; numbers in parentheses all percent of controls

d/ $CuSO_4$ concentration expressed as ppmw copper ion

Growth of sago pondweed from tubers exposed to various concentrations of chlorsulfuron and DPX5648. Dechoretz, N. and L. W. J. Anderson. Previous studies have shown that chlorsulfuron and DPX5648 applied to water at concentrations as low as 1.0ppb will significantly inhibit the growth of sago pondweed. A greenhouse study was conducted to determine whether or not significant amounts of these compounds are absorbed by germinating pondweed tubers to inhibit subsequent weed growth.

Four tubers were placed in flasks containing water treated with 0.1, 0.25, 0.50, 0.75 and 1.0ppmw of chlorsulfuron or DPX5648. After exposing the tubers to the herbicides for 24 hours, the tubers were removed from the flasks, rinsed for one minute under flowing tap water and then planted in plastic pots and placed in jars containing 3.8 ℓ of water. The degree of herbicidal activity was based on the length, fresh weight and dry weight of plants four weeks after treatment.

Based on plant length, the growth of sago pondweed from tubers exposed to 0.25ppmw of chlorsulfuron for 24 hours was significantly reduced, (see enclosed table). DPX5648 was more active. Growth of sago pondweed exposed to 0.10ppmw DPX5648 was reduced by 78%. The activity of both compounds is further demonstrated by the amount of fresh and dry weight of plants in jars. For example, the fresh and dry weight of sago pondweed grown from tubers treated with 0.10ppmw chlorsulfuron was reduced by 45.6 and 53.4%, respectively. In contrast, fresh weight and dry weight of plants grown from tubers exposed to 0.10 ppmw DPX5648 was reduced by 85.1 and 88.1%, respectively. (USDA Aquatic Weed Control Research, Botany Department, University of California, Davis, CA 95616).

Growth of sago pondweed 4 weeds after exposing tubers to chlorsulfuron and DPX5648 for 24 hours

Treatment rate (ppmw)	Plant Response[1/]					
	Length(cm)		Fresh weight(g)		Dry weight(g)	
	Chlorsulfuron	DPX5648	Chlorsulfuron	DPX5648	Chlorsulfuron	DPX5648
0	46.6±6.1	46.7±5.4	14.94±2.79	15.3 ±1.01	2.51±.37	2.59±.26
0.10	34.9±5.2	10.3±3.7	8.13±1.66	2.29±.18	1.17±.29	0.31±.01
0.25	15.1±5.5	7.7±2.8	2.85± .85	1.17±.52	0.42±.11	0.17±.07
0.50	8.3±2.3	5.6±0.3	1.77± .15	1.11±.10	0.31±.02	0.19±.02
0.75	5.9±0.5	4.8±0.6	1.96± .22	0.92±.05	0.25±.06	0.13±.01
1.00	6.6±1.1	5.2±0.4	1.31± .12	0.91±.12	0.20±.03	0.13±.01

[1/] Values represent mean ± standard error

Bindweed control in Eastern New Mexico in non-cropland. Dickerson, G. W. Bindweed is a major weed problem in Eastern New Mexico. A number of products are recommended for bindweed control in non-cropland. The purpose of this experiment was to compare a relatively new compound, DPX 5648, against other more traditional bindweed herbicides.

In June and September of 1981, six herbicides were evaluated at six locations in Chaves, Curry and Quay counties in Eastern New Mexico. Herbicides included dicamba, dicamba 5% granules, dicamba + 2,4-D, fosamine, glyphosate and four rates of DPX 5648. With the exception of the dicamba granules, all herbicides were mixed in water in a 55 gallon drum. All of these except glyphosate also contained Ortho X77 nonionic surfactant at a rate of 1 qt /100 gal H_2O. The foliage of the bindweed was thoroughly wetted with the chemicals, which were pumped from the drum with a small, gasoline-powered sprayer and handgun. The granules were spread with a hand spreader. The bindweed was in relatively good shape at all locations and was blooming. Plots were evaluated for plant top kill at each location approximately two months after application.

All herbicides containing dicamba were very effective in controlling bindweed at all locations, including the dicamba granules. The two higher rates of DPX 5648 were also generally quite consistant in controlling bindweed. At these rates, DPX 5648 tended to act as a soil sterilant. The glyphosate, fosamine, and lower rates of DPX 5648 were inconsistant in their control. Glyphosate and fosamine might give 95% control in one location and 5 to 20% at another. Bindweed control with these latter treatments would seem to be more dependent on the physiological condition of the bindweed plant than for the dicamba treatments. The plants will be checked again next year for actual plant kill. (New Mexico Coop. Ext. Ser., Las Cruces, New Mexico 88003)

Control of bindweed in Eastern New Mexico in non-cropland.

Treatment	Rate lb ai/100 gal H_2O	% Top Kill						
		County and Date of Application						
		Chaves 6/23/81	Chaves 9/30/81	Curry 6/9/81	Quay 6/16/81	Quay 6/18/81	Quay 9/2/81	Average
Check	---	0	0	0	0	0	0	0
Dicamba	2.00	95	100	80	99	97	100	95.2
*Dicamba 5% granules	*4.00	95	100	85	99	--	95	94.8
Dicamba + 2,4-D	0.50 + 1.50	98	100	85	95	70	100	91.3
DPX 5648	1.50	98	95	85	80	97	95	91.7
DPX 5648	0.75	90	95	90	85	60	90	85.0
DPX 5648	0.37	60	95	25	85	--	60	65.0
DPX 5648	0.19	10	70	5	25	--	5	23.0
Fosamine	12.00	95	50	15	80	95	5	56.7
Glyphosate	4.00	95	85	50	30	30	20	51.7

*Rate was 4 lb ai/A

Weed control with annual applications of five herbicides on non-crop sites. Hamilton, K. C. and C. H. Doty. A test was conducted at seven sites between Phoenix and Tucson along the right-of-way of Interstate Highways 8 and 10 to compare the effectiveness of bromacil, diuron, hexazinone, simazine, and tebuthiuron in controlling annual weeds on non-crop areas. Herbicides were applied to the soil in early winter. Plots (4000 sq. ft.) were treated with 6 lb/A of each herbicide in 1976 and the same plots were retreated with 3 lb/A of the herbicides in 1977, 1978, and 1979. Winter annual weeds were Mediterraneangrass, London rocket, filaree, and little mallow. Summer annual weeds were Russian thistle, Palmer amaranth, puncturevine, and Coulter spiderling. Soils on the test areas ranged from 25 to 70% sand, 16 to 50% silt, 14 to 25% clay, and 1 to 2% organic matter. Total rainfall during the past 6 years has ranged from 40 to 64 inches on the tests. In 1979, six of the seven sites were slightly disturbed by road reconstruction. Weed control on each plot was estimated five times each year for the past 6 years.

During the first year weed control was best with bromacil, hexazinone, and tebuthiuron (see table). Simazine gave the least control of winter annual weeds during the first season. During the second, third, and fourth year simazine was only slightly less effective than the other herbicides. In 1980, the first year herbicides were not applied, weed control was reduced with diuron and simazine. In 1981, the second year after treatments ended, only tebuthiuron was giving complete control of annual weeds. A few bermudagrass and silverleaf nightshade plants were present on some of the tests. These perennial weeds were controlled by the repeated applications of bromacil, hexazinone, and tebuthiuron. (Plant Sciences Dept., University of Arizona, Tucson, AZ 85721).

Annual weed control with four applications of five herbicides at seven sites in Arizona

Treatment	lb/A/yr		Estimated percent annual weed control					
	1976	1977-79	1976	1977	1978	1979	1980	1981
bromacil	6	3	99	100	100	100	99	90
diuron	6	3	97	99	100	100	90	75
hexazinone	6	3	100	100	100	100	100	95
simazine	6	3	90	97	99	99	90	75
tebuthiuron	6	3	100	100	100	100	100	100
untreated			0	0	0	0	0	0

Evaluation of mefluidide for ditchbank weed suppression Krall, James M. The Truckee-Carson Irrigation District has a serious problem with ditchbank weeds. Lateral ditches which are used intermittently become clogged with weeds by mid-summer. Complete removal of these weeds can lead to serious erosion problems. With this in mind, the growth regulator, mefluidide, was evaluated for suppression of ditchbank weeds.

Mefluidide was applied at 1/4, 1/2, 3/4 and 1 lb ai/A using a 4-nozzle backpack sprayer at 22 gal/A. Each treatment was replicated 3 times in a randomized complete block design. Individual plot size was 6 ft by 45 ft. Treatment applications were made June 5, 1981 to a weed complex of primarily quackgrass, Kentucky bluegrass, showy milkweed, buckhorn plantain, and white sweetclover. Weeds were actively growing with a canopy height ranging from 2 to 18 inches.

Visual observations of the treatments made July 13, 1981 showed no suppression of plant canopy growth compared to the no-treatment plots. The lack of treatment effect may have been due to the mixed species nature of the plant canopy. (Integrated Pest Management Division, College of Agriculture, University of Nevada-Reno, Reno, Nevada 89557).

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 four 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 and 0.5 ppmw, mono (N,N-dimethylalkyamine) 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. (USDA-SEA-ARS, 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.

Control of rooted submersed aquatic weeds in mosquitofish holding ponds with mirror carp. Yeo, R. R. and J. R. Thurston. Mirror carp, weighing 28 g each, were stocked in three weedy 0.25 A ponds at a rate of 250/A during March and April, 1981. Three similar weedy ponds were left unstocked for controls. The ponds had been infested with sago pondweed, southern naiad, and chara in 1980. Two of the stocked ponds and two control ponds required a late April treatment with simazine to facilitate an early mosquitofish harvest. These ponds remained free of weeds from July to November. Water in all ponds stocked with mirror carp rapidly became and remained turbid. The water in all the control ponds remained clear. In the one stocked pond treated with simazine, the established weed cover was reduced from 60% to 25%. The weed cover in the untreated control pond increased from 60% to 100%. Weed control was attributed to both turbidity and physical uprooting. Production of mosquitofish was not affected by the presence of mirror carp. (USDA-SEA-ARS, Botany Department, University of California, Davis, CA 95616)

PROJECT 7

CHEMICAL AND PHYSIOLOGICAL STUDIES

Lowell Jordan - Project Chairman

<u>The effects of citric acid cycle intermediates on barnyardgrass (*Echinochloa crusgalli*) seed dormancy and germination</u>. Jordan, James L. Barnyardgrass seeds were germinated in 0.0001 M concentrations of various intermediates common to the citric acid cycle so that the effects of citric acid cycle intermediates on barnyardgrass seed dormancy and germination could be investigated. Nine hundred seeds (in 100-seed replicates) were germinated in each solution at 35 C for two days. Each test was repeated in time. The data for each intermediate were pooled and compared to a water standard. Oxaloacetic acid, acetyl CoA, citric acid, isocitric acid, coenzyme A, succinyl CoA, succinic acid, fumaric acid, and malic acid stimulated barnyardgrass seed germination. No intermediates, that were tested, reduced barnyardgrass seed germination. Further research is needed to elucidate the reasons for these results. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

The effects of citric acid cycle intermediates on barnyardgrass seed germination

Intermediate	Percent Germination (mean)	Change from Water standard
Water standard	60	---
Oxaloacetic acid (OAA)	84	24
Acetyl CoA (lithium salt)	91	31
Citric acid	97	37
Isocitric acid	94	34
Coenzyme A (lithium salt)	89	29
Succinyl CoA (sodium salt)	90	30
Succinic acid	64	4
Fumaric acid	70	10
Malic acid	61	1

The effects of glycolysis intermediates on barnyardgrass (*Echinochloa crusgalli*) seed dormancy and germination. Jordan, James L. Barnyardgrass seeds were germinated in 0.0001 M concentrations of various intermediates common to the glycolysis pathway so that the effects of glycolysis intermediates on barnyardgrass seed dormancy and germination could be investigated. Nine hundred seeds (in 100-seed replicates) were germinated in each solution at 35 C for two days. Each test was repeated in time. The data for each intermediate was pooled and compared to a water standard. Fructose, fructose 6-phosphate, fructose 1,6-diphosphate, dihydroxy acetone phosphate, and glyceraldehyde 3-phosphate stimulated barnyardgrass seed germination. However, 3-phosphoglycerate, 2-phosphoglycerate, and pyruvic acid decreased barnyardgrass seed germination. Further research is needed to elucidate the reasons for these results. (Botany and Plant Sciences Dept., University of California, Riverside, California 92521).

The effects of glycolysis intermediates on barnyardgrass seed germination

Intermediate	Percent Germination (mean)	Change from water standard
Water standard	60	---
Fructose	79	19
Fructose 6-phosphate (potassium salt)	95	35
Fructose 1,6-diphosphate (trisodium salt)	96	36
Dihydroxy acetone phosphate (DHAP) (lithium salt)	87	27
Glyceraldehyde 3-phosphoric acid	92	32
3-Phosphoglycerate (calcium salt)	13	-47
2-Phosphoglycerate (sodium salt)	40	-20
Pyruvic acid	37	-23

<u>The effects of glyoxylate cycle intermediates on barnyardgrass (Echinochloa crusgalli) seed dormancy and germination</u>. Jordan, James L. Barnyardgrass seeds were germinated in 0.0001 M concentrations of various intermediates common to the glyoxylate cycle so that the effects of glyoxylate cycle intermediates on barnyardgrass seed dormancy and germination could be investigated. Nine hundred seeds (in 100-seed replicates) were germinated in each solution at 35 C for two days in the dark. Each test was repeated in time. The data for each intermediate were pooled and compared to a water standard. Oxaloacetic acid, acetyl CoA, citric acid, and isocitric acid stimulated barnyardgrass seed germination. Glyoxylic acid reduced barnyardgrass seed germination. Further research is needed to elucidate the reasons for these results. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

The effects of glyoxylate cycle intermediates on barnyardgrass seed germination

Intermediate	Percent Germination (mean)	Change from Water standard
Water standard	60	---
Oxaloacetic acid (OAA)	84	24
Acetyl CoA (lithium salt)	91	31
Citric acid	97	37
Isocitric acid	94	34
Glyoxylic acid	38	-22

The effects of pentose phosphate pathway intermediates on barnyardgrass (*Echinochloa crusgalli*) seed dormancy and germination. Jordan, James L. Barnyardgrass seeds were germinated in 0.0001 M concentrations of various intermediates common to the pentose phosphate pathway so that the effects of pentose phosphate pathway intermediates on barnyardgrass seed dormancy and germination could be investigated. Nine hundred seeds (in 100-seed replicates) were germinated in each solution at 35 C for two days. Each test was repeated in time. The data for each intermediate were pooled and compared to a water standard. The following pentose phosphate intermediates stimulated barnyardgrass seed germination: 6-phosphogluconate, glyceraldehyde 3-phosphoric acid, and ribose 5-phosphate. Because methylene blue has a stimulatory effect on the pentose phosphate pathway, even though it is not an intermediate in the pentose phosphate pathway, it was also used in germination tests. Methylene blue also stimulated barnyardgrass seed germination. Further research is needed to elucidate the reasons for these results. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

The effects of pentose phosphate pathway intermediates on barnyardgrass seed germination

Intermediate	Percent Germination (mean)	Change from Water standard
Water standard	60	---
6-Phosphogluconate (trisodium salt)	92	32
Glyceraldehyde 3-phosphoric acid	92	32
Ribose 5-phosphate (disodium salt)	96	36
Methylene blue	86	26

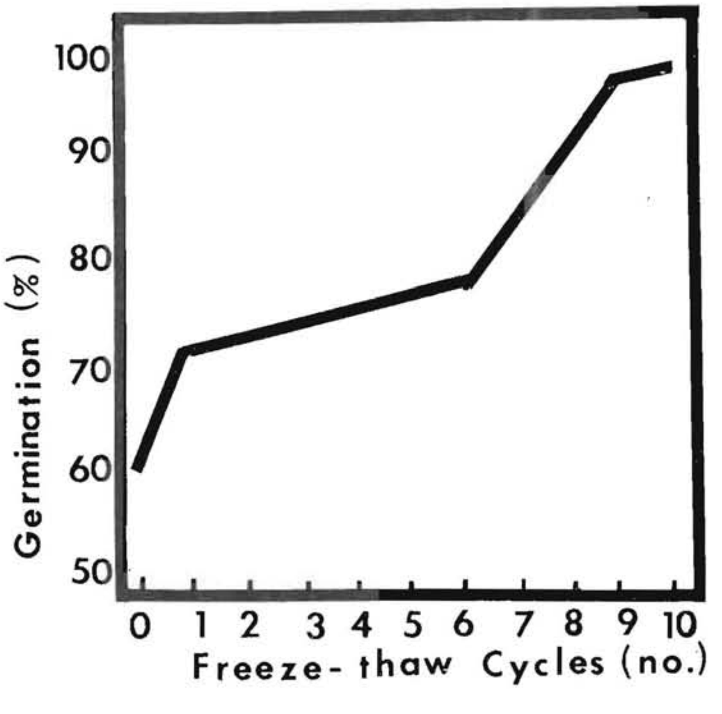
The effects of various chemicals and metabolic intermediates on barnyardgrass (*Echinochloa crusgalli*) seed dormancy and germination. Jordan, James L. Barnyardgrass seeds were germinated in 0.0001 M concentrations of various chemicals and metabolic intermediates to investigate their effects on barnyardgrass seed dormancy and germination. Tween 20 was used at a concentration of 0.1% (v/v) instead of 0.0001 M. Nine hundred seeds (in 100-seed replicates) were germinated in each solution at 35 C for two days. Each test was repeated in time. The data for each chemical were pooled and compared to a water standard. Tween 20, glycine, ATP, and NADH apparently stimulated barnyardgrass seed germination, whereas ADP and KNO_3 resulted in decreased barnyardgrass seed germination. Further research is needed to elucidate the reasons for these results. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

The effects of various chemicals and metabolic intermediates on barnyardgrass seed germination

Chemical (or intermediate)	Percent Germination (mean)	Change from Water standard
Water standard	60	---
Tween 20	95	35
ADP (sodium salt)	43	-17
ATP (disodium salt)	83	23
Glycine	92	32
KNO_3	52	-8
NADH	87	27

Low temperature (-196 C) freezing affects barnyardgrass seed germination. Jordan, James L. The effects of repeated low temperature freezing and subsequent thaing on barnyardgrass seed germination were invetigated. Barnyardgrass seeds were repeatedly frozen in liquid nitrogen (-196 C) and thawed for one hour in 23 C air. After 0, 1, or 8 freeze-thaw cycles, 1,000 seeds (in 100-seed replicates) from each freeze-thaw regime conducted were incubated between moistened pieces of filter paper at 35 C in the dark. The number of seeds germinated increased with the number of freeze-thaw cycles that the seeds were exposed to. As a consequence, low temperature freezing may be a valuble aid in barnyardgrass seed dormancy research. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

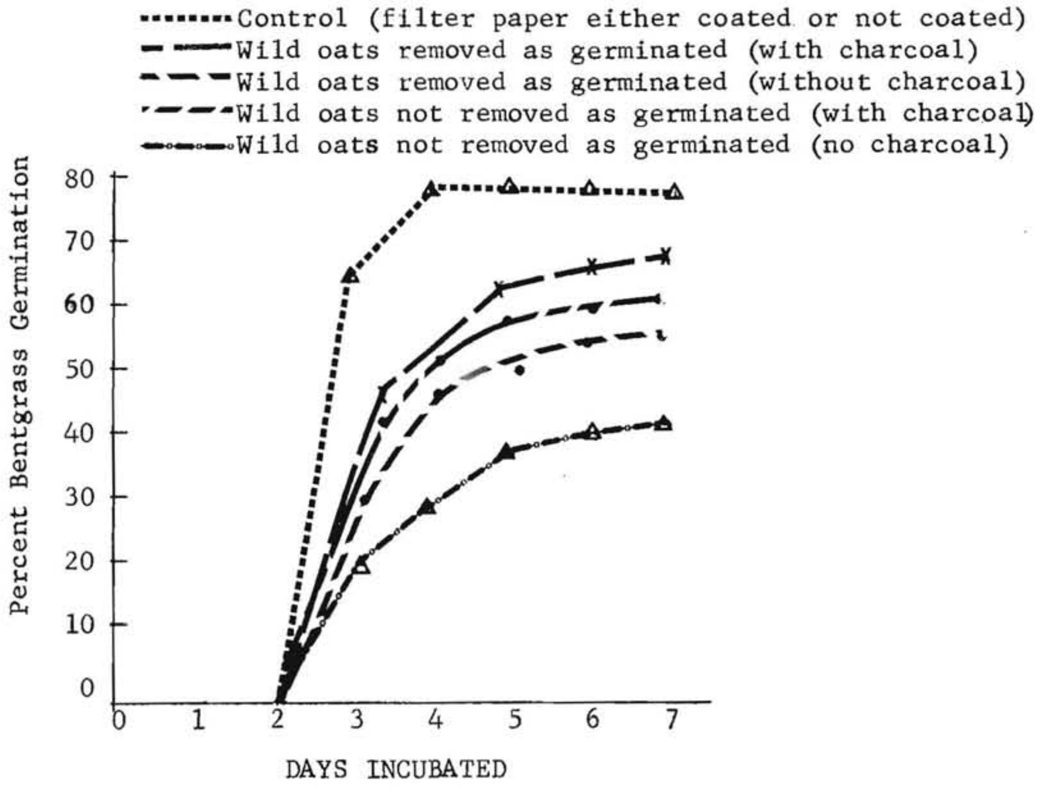
Effect of repeated low temperature (-196 C) freezing and subsequent thawing on barnyardgrass seed germination (seeds were incubated for 1 week)



Effect of germinating wild oats on bentgrass germination. Jordan, Lowell S., James L. Jordan, and Catalina M. Jordan. One hundred wild oat and 100 bentgrass seeds were placed randomly and germinated on filter paper in petri dishes. The filter paper was either coated with activated charcoal or left untreated. Wild oat seeds were removed at the time of germination or left on the filter paper after germination. The number of germinated bentgrass seeds were counted daily. Water was added as needed, light was continuous, and temperature was constant at 30 C.

Maximum bentgrass germination (80%) was obtained without wild oat seeds on either carbon-coated or uncoated filter paper. Germinating wild oats reduced the germination of bentgrass. Removal of wild oats as they germinated reduced their effect on bentgrass germination. The results indicate that germinating wild oats are alleopathic to bentgrass seed germination. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Effect of wild oats on bentgrass germination with and without activated charcoal



Characteristics of light and dark colored giant foxtail (Setaria faberi) seeds. Jordan, James L. Giant foxtail seeds from two locations in Iowa were seperated into either light or dark colored seeds so that the characteristics of giant foxtail seeds of the different colors could be investigated. Six hundred seeds (in 100-seed replicates) from each site were used to determine fresh weight, percent imbibition after 24 hours, and percent moisture. Dark colored seeds had greater fresh weight and dry weight than did light colored seeds. Percent water imbibition (after 24 hours) was the same for dark and light colored seeds. Light and dark colored seeds were also incubated between moist pieces of filter paper at 32 C for one week. The number of seeds that germinated daily was determined. More dark colored seeds germinated than did light colored seeds. The physiological basis for these results have yet to be determined. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Fresh weight, percent imbibition, and percent moisture of light and dark colored giant foxtail seeds

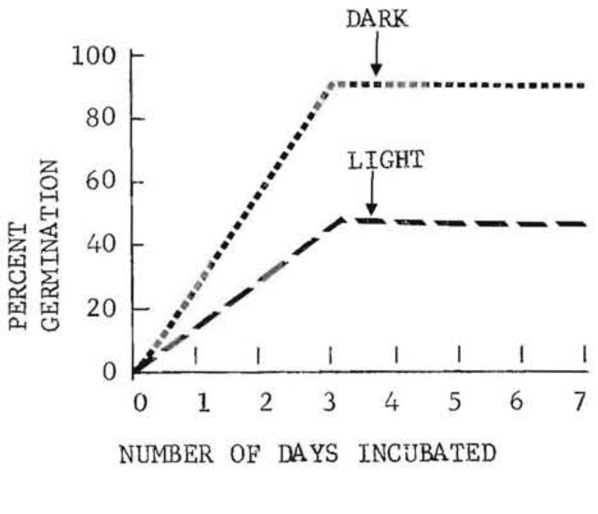
Parameter	Light seeds	Dark seeds
Fresh weight[a] (ave.) (g)	0.180	0.127
Percent imbibition[b] (ave.)	61	56
Percent moisture[c] (ave.)	6.1	10.7

[a]Fresh weight per 100 seeds

[b]Percent weight increase after imbibition at 23 C for 24 hours

[c]Percent weight decrease after drying at 105 C for 24 hours

Percent light or dark colored giant foxtail seed germination versus the number of days of incubation between moistened pieces of filter paper at 32 C



Vegetative growth of green foxtail and yellow foxtail as affected by maize competition. Jordan, James L. The vegetative growth of green foxtail and yellow foxtail, as affected by maize competition, was investigated in a two-year study in Iowa. During May 1979 and May 1980, plots at two locations were designed so that some weeds would grow without competition from maize and other weeds would grow with severe maize competition. During mid-August 1979 and mid-August 1980, the following parameters were measured: plant height (in cm), plant fresh weight (in kg), and number of tillers (per plant). Weeds grown with maize competition had less vegetative growth than weeds grown without maize competition. This indicates that maize has a severe competitive effect on green foxtail and yellow foxtail plants. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Vegetative growth of green foxtail as affected by maize competition

Parameter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Height (cm)	137 ± 6	63 ± 9	-54
Weight (kg) (wet)	1.33 ± 0.75	0.10 ± 0.01	-92
Tillers (no)	21 ± 5	3 ± 2	-86

Vegetative growth of yellow foxtail as affected by maize competition

Parameter measured Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Height (cm)	135 ± 6	50 ± 10	-63
Weight (kg) (cm)	1.54 ± 0.38	0.10 ± 0.01	-94
Tillers (no)	16 ± 4	7 ± 5	-56

Reproductive parameters of green foxtail and yellow foxtail as affected by maize competition. Jordan, James L. Different reproductive parameters of green foxtail and yellow foxtail as affected by maize competition were investigated in a two-year study in Iowa. During May 1979 and May 1980, plots attwo locations were designed so that some weeds would grow without competition from maize and other weeds would grow with severe maize competition. During mid-August 1979 and mid-August 1980, the following parameters were measured: number of spikes per plant, spike length (in cm) and number of seeds per spike. Weeds grown with maize competition had fewer spikes per plant, shorter spike length, and fewer seeds per spike than did weeds grown without maize competition. More research is needed to better understand the competitive effects of crops (i.e. maize) on weeds. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Reproductive parameters of green foxtail as affected by maize competition

Parameter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Spikes (no)	36 ± 4	6 ± 4	-83
Spike length (cm)	9.0 ± 3.1	4.0 ± 2.3	-56
Seeds per spike (no)	659 ± 29	137 ± 19	-79

Reproductive parameters of yellow foxtail as affected by maize competition

Parameter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Spikes (no)	17 ± 4	3 ± 2	-82
Spike length (cm)	7.9 ± 1.7	4.0 ± 1.4	-49
Seeds per spike (no)	238 ± 15	98 ± 6	-59

Characteristics of light and dark colored green foxtail (*Setaria viridis*) seeds. Jordan, James L. Green foxtail seeds from two locations in Iowa were seperated into either light or dark colored seeds so that the characteristics of green foxtail seeds of the two different colors could be investigated. Six hundred seeds (in 100-seed replicates) from each site were used to determine fresh weight, percent imbibition after 24 hours, and percent moisture. Dark colored seeds had greater fresh weight, imbibed more water after 24 hours imbibition, and had a higher moisture content than did light colored seeds. Light and dark colored seeds were also incubated between moist pieces of filter paper at 32 C for one week. The number of seeds that germinated daily was determined. More dark colored seeds germinated than did light colored seeds. The physiological basis for these results have yet to be determined. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Fresh weight, percent imbibition, and percent moisture of light and dark green foxtail seeds

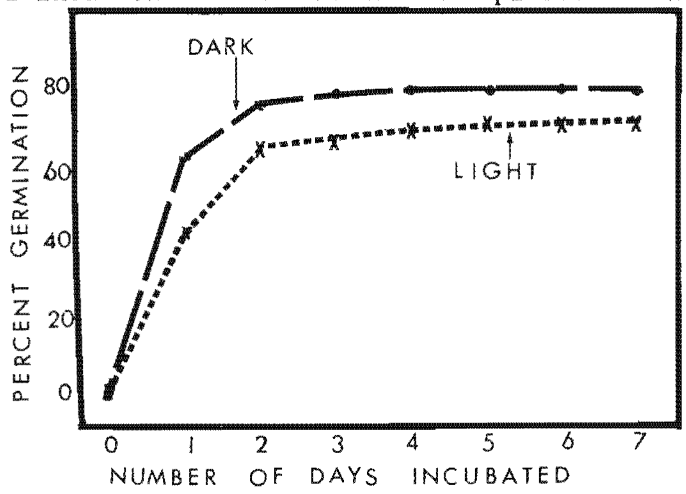
Parameter	Light Seeds	Dark Seeds
Fresh weight[a] (ave.) (g)	0.080	0.101
Percent imbibition[b] (ave.)	86	99
Percent moisture[c] (ave.)	5.4	12.7

[a]Fresh weight per 100 seeds

[b]Percent weight increase after imbibition at 23 C for 24 hours

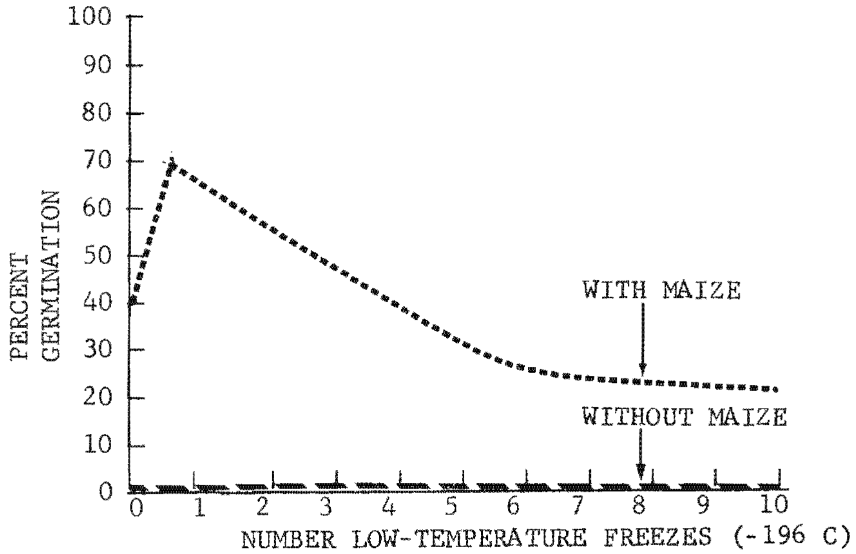
[c]Percent weight decrease after drying at 105 C for 24 hours

Percent light or dark colored green foxtail germination versus the number of days of incubation between moistened pieces of filter paper at 32 C

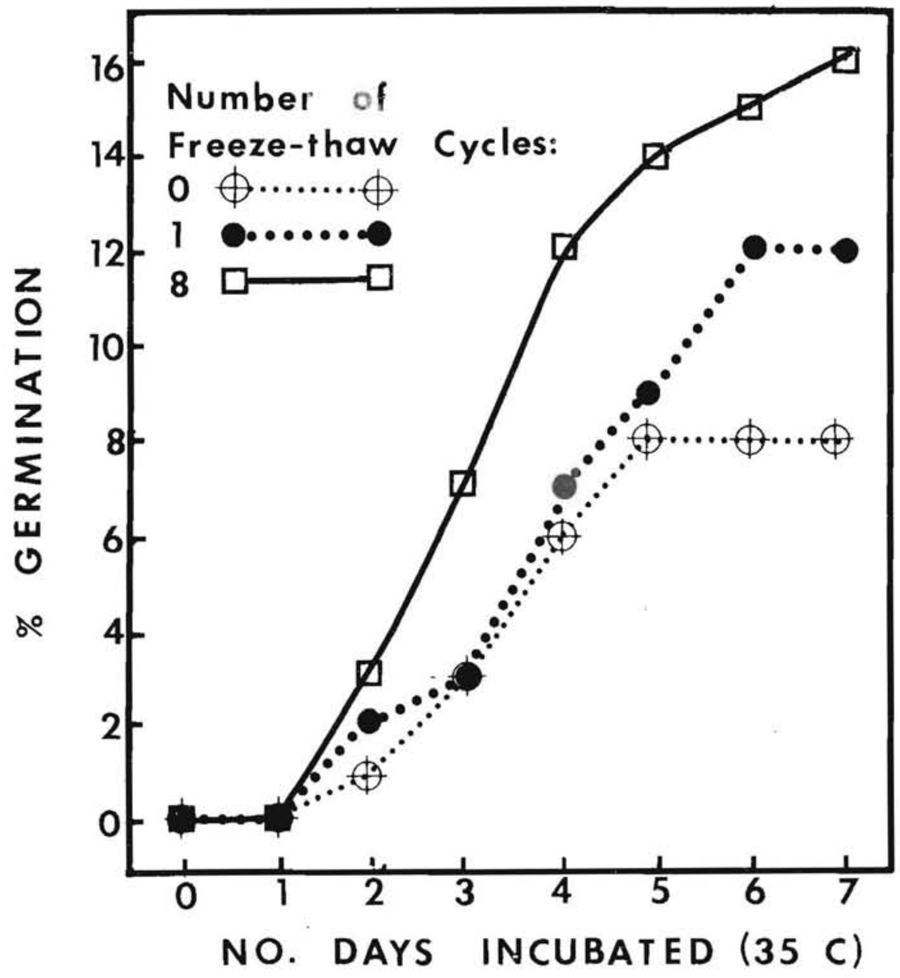


Differences in the response of yellow foxtail seeds to low temperature freezing to -196°C. Jordan, J. L., L. S. Jordan, and C. M. Jordan. Research was conducted to investigate the dormancy of yellow foxtail seeds as influenced by low temperature freezing and parental stress. During May 1979 and May 1980, plots at two sites in Iowa were designed so that some weeds would grow without maize competition and other weeds would grow with severe maize competition. During mid-September 1979 and mid-September 1980, seeds were collected from the yellow foxtail plants. Yellow foxtail seeds were repeatedly frozen in liquid nitrogen (-196#C) and thawed for one hour in 23°C air. Freeze-thaw tests were repeated three times. After 0 up to 10 freezes, 300 seeds from each collection site, each collection year, and each freezing-thaw combination were germinated between moist pieces of filter paper at 35°C for one week in the dark. Germination tests were repeated three times. Seeds collected from plants without maize competition remained dormant even with freeze-thaw treatments. However, seeds collected from plants with maize competition increased germination with one freeze-thaw treatment from 40% to 70%. Subsequent freeze-thaw treatments reduced the percent germination of yellow foxtail seeds (from with maize competition plants). Because the yellow foxtail plants grew in the same kind of soil, in the same field (only a few feet apart in distance), and in the same time period, with only maize competition different, it is unlikely that the yellow foxtail plants are of different biotypes (they had been thinned randomly). Thus, yellow foxtail seed research needs to take into account the nature of competition which the parent plats were exposed to. Also, because more than one freeze-thaw combination severely affected the seeds from with maize competition plants, the effects of repeated freezing and thawing on germplasm storage (i.e. seeds) should be carefully considered. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Effect of low temperature freezing on yellow foxtail seeds collected from yellow foxtail plants grown with two levels of maize competition

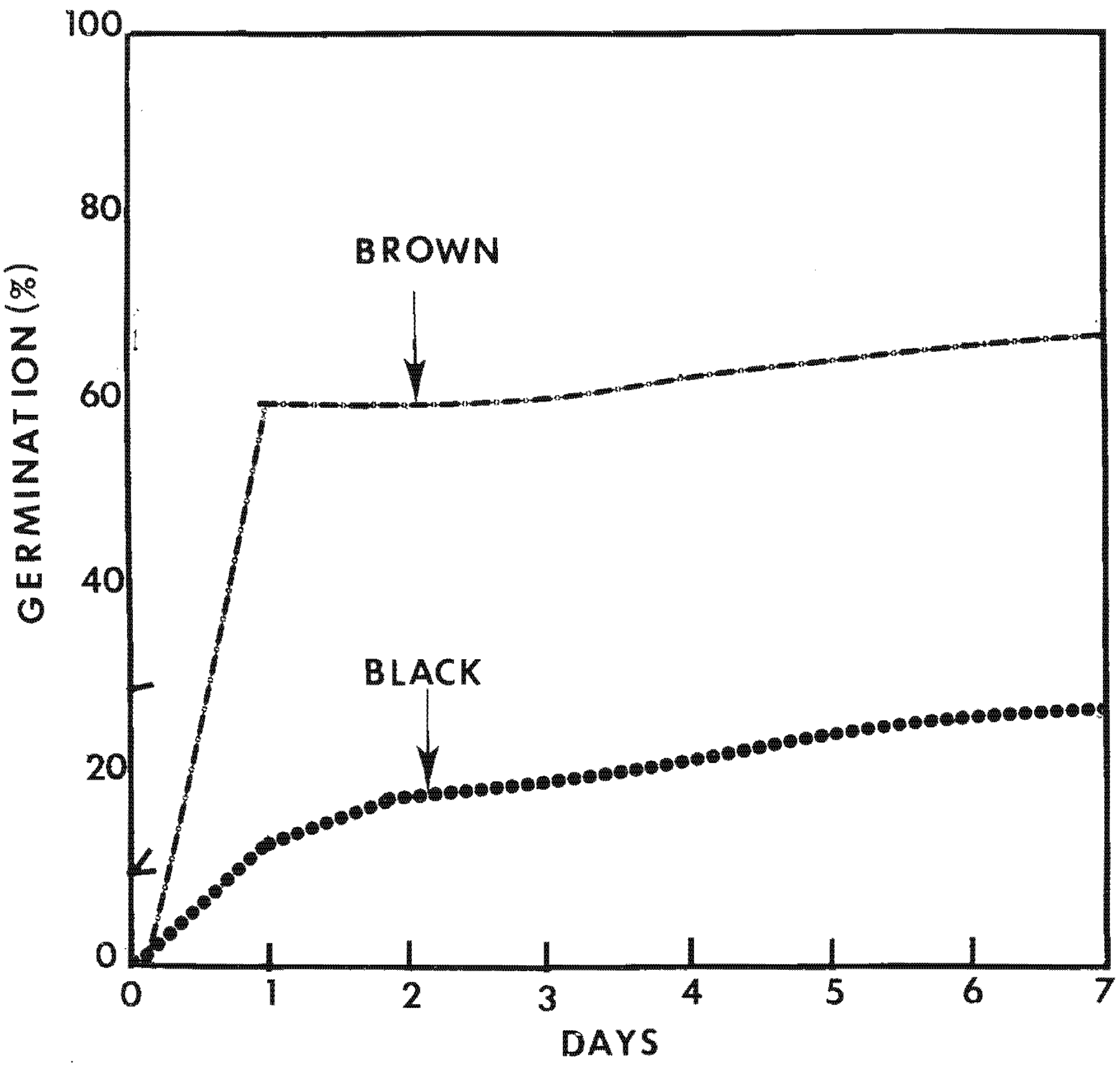


Repeated low temperature freezing and subsequent thawing on common lambsquarters seeds. Jordan, James L. The effects of repeated low temperature freezing and subsequent thawing on common lambsquarters seed germination were investigated. Common lambsquarters seeds were repeatedly frozen in liquid nitrogen (-196 C) and thawed for one hour in 23 C air. After 0, 1, or 8 freeze-thaw cycles, 1,000 seeds (in 100-seed replicates) from each freeze-thaw regime conducted were incubated between moistened pieces of filter paper at 35 C in the dark. The number of seeds germinated was counted daily for one week. Seeds that had been frozen 8 times had the fastest rate of germination and the highest percent germination. Seeds that had been frozen and thawed once had a similar rate of germination as non-frozen seeds up to 5 days after imbibition onset; however, seeds that had been frozen and thawed once had a higher level of percent germination than seeds that had never been frozen and thawed. The physiological or mechanical reasons for these results have yet to be determined for common lambsquarters seeds. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).



Percent Common lambsquarters seed germination versus number of days incubated at 35 C between moist filter papers as related to the number of freeze-thaw cycles

Some differences between black and brown common lambsquarters seeds. Jordan, James L., Lowell S. Jordan, and Catalina M. Jordan. Black and brown common lambsquarters seeds were studied to note differences between the seeds of the two different colors. Brown common lamsquarters seeds germinated at a faster rate and reached a higher level of germination than did black common lambsquarters seeds. This difference may be partly due to differences in the seed coat thicknesses of black and brown common lambsquarters seeds. The black seeds had a seed coat thickness of 3.3 $\pm$ 0.3 microns, whereas the brown seeds had a seed coat thickness of 1.3 $\pm$ 0.3 microns. The thicker seed coat may have an adverse effect on water penetration or gaseous exchange for black seeds; thus, the black seeds would germinate slower than would brown seeds.
(Department of Botany and Plant Sciences, University of California, Riverside, California 92521).



Per cent germination of black and brown common lambsquarters seeds versus the number of days incubation

Differences among common lambsquarters seeds from different locations and harvest dates. Jordan, James L., Lowell S. Jordan, and Catalina M. Jordan. Common lambsquarters seeds that had been collected in either Iowa or California were seperated into black and browh seeds to determine if a specific ratio between black and brown seeds existed. The ratio between black and brown seeds varies considerably, even among seeds collected at locations near each other. Therefore, the determination of the black to brown ratio may be quite complicated and may involve the interactions of several different factors. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Common lambsquarters seed color

Location	Year Collected	Black (%)	Brown (%)	Ratio Black:Brown
Ames, Iowa	1970	81.1	18.9	4.3 : 1
Ames, Iowa	1971	90.5	9.5	9.5 : 1
Ames, Iowa (Hind's Farm)	1977	95.9	4.1	23.4 : 1
Ames, Iowa (Curtiss Farm)	1977	84.5	15.5	5.4 : 1
Fresno, California	1978	73.5	26.5	2.8 : 1

Differences between field bindweed seeds collected from two locations in California. Jordan, James L., Lowell S. Jordan, and Catalina M. Jordan. Mature, dry field bindweed seed were collected in 1978 near Fresno and during 1979 and 1980 near Riverside, California. Seeds were prechilled at 5 C for 8 weeks, or scarified with a file, or left untreated prior to germination testing. The seeds collected near Fresno, California, were more germinable than seeds collected near Riverside, California. Scanning electron microscopy revealed that the Fresno seeds had more porous seed coats than did Riverside seeds. Furthermore, pre-chilling tended to increase seed coat porosity as well as increase germinability. Field bindweed seed dormancy is most likely seed coat induced. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

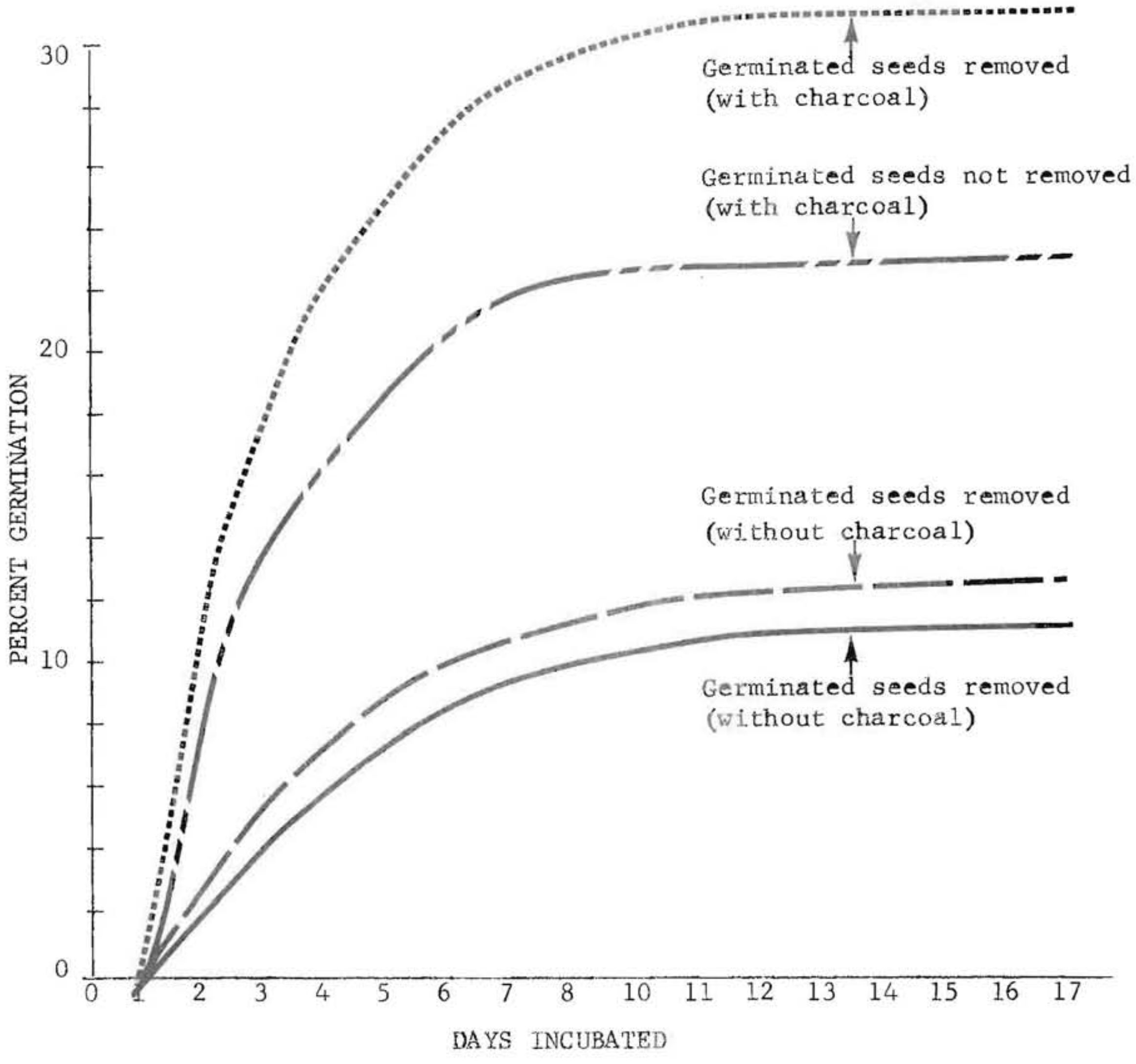
Field Bindweed seed germination (%)

Collection Site	Treatment		
	5C (8 wk)	Scarified	Control
Riverside	55	93	5
Fresno	90	97	9

Self-inhibition of wild oat germination. Jordan, L. S., J. L. Jordan, and C. M. Jordan. Wild oat (*Avena fatua* L.) seeds were placed in petri dishes on filter paper that had been either coated or not coated with activated charcoal. Water was added as needed, light was continuous, and temperature was constant at 30°C. Five replications of 100 seeds were used. Wild oats were either removed or left on the filter paper after germination in order to test the affect of germinating wild oat seeds on the germination of other wild oat seeds.

Activated carbon decreased the inhibitory effects of wild oat seeds on other wild oat seed germination. Removal of the seeds as they germinated also decreased the inhibition of other seeds of the same species. (Department of Botany and Plant Sciences, Univeristy of California, Riverside CA 92521).

Effect of germinating wild oat seeds on germination of other wild oat seeds with and without activated charcoal



Effects of weeds on 'Valencia' orange fruit quality. Jordan, L. S., J. L. Jordan, R. C. Russell, R. Krueger, and C. M. Jordan. The effects of weeds on 'Valencia' orange fruit quality were investigated in a 14 year old 'Valencia' orange orchard. The two weed populations used in this research consisted either of annual weeds (Amaranthus spp., Chenopodium spp., Conyza spp., Cirsium vulgare, Bromus spp., and Hordeum spp.) or of bermudagrass (Cynodon dactylon cv. 'Tifway'). Annual weed infested plots were either sprinkler or furrow irrigated; bermudagrass infested plots were sprinker irrigated. After the weeds had been allowed to become established for three years, three levels of weed control were established. Complete weed control was obtained by using paraquat and simazine. Partial (50% control) weed control was obtained by using paraquat only. No weed control plots had no herbicide weed control. At harvest, 18 fruit were picked at random from each tree in each plot for quality determinations.

In plots where bermudagrass was not controlled, the fruit produced tended to be larger than the fruit from plots were bemudagrass was either partially or completely controlled. Complete control of annual weeds and bermudagrass generally did not result a different fruit quality from those plots with partial weed control. If either annual weeds or bermudagrass were not controlled, soluble solids and acid increased, when compared to the soluble solids and acid content of fruit from plots with either partial or complete weed control; however, the solids/acid ratio was not affected by the presence or absence of weed control. Differences in fruit quality appear to have resulted from the amount of competition from weedy vegetation for water and nutrients. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Fruit quality of 'Valencia' oranges from trees grown with different methods of irrigation and levels of weed control[z]

Irrigation	Vegetation	Control level	Control %	Fruit diam (mm)	Juice (%)	Soluble solids (%)	Acid (%)	Solid/Acid ratio
Furrow	Annual weeds	None	0	64.8a	59.4g	14.2n	1.2u	11.9a
		Partial	50	63.3b	58.5gh	12.6no	1.1uv	12.3a
		Complete	100	61.2b	57.3h	12.4o	1.0v	12.2a
Sprinkler	Annual weeds	None	0	69.5c	57.3i	13.6p	1.3w	10.8b
		Partial	50	64.5d	57.0j	12.5r	1.1x	10.6b
		Complete	100	65.5d	55.5k	12.3r	1.1x	10.6b
Sprinkler	Bermudagrass	None	0	70.4e	58.7m	13.3s	1.3y	10.2c
		Partial	50	66.0f	56.3mn	12.4t	1.1z	10.7c
		Complete	100	65.5f	55.5n	12.3t	1.1z	10.6c

[z]Mean seperation within columns (for each irrigation-weed combination) by Duncan's multiple range test, 5% level

Effects of weeds on the photosynthetic rate and chlorophyll concentration of 'Valencia' orange leaves. Jordan, L. S., J. L. Jordan, R. C. Russell, R. Krueger, and C. M. Jordan. The effects of weeds on the photosynthetic rate and chlorophyll content of leaves of 'Valencia' orange trees were investigated in a 14 year old 'Valencia' orange orchard. The two weed populations used in this research consisted of either annual weeds (*Amaranthus* spp., *Chenopodium* spp., *Conyza* spp., *Cirsium vulgare*, *Bromus* spp., and *Hordeum* spp.) or bermudagrass (*Cynodon dactylon* cv. 'Tifway'). Annual weed infested plots were either sprinkler or furrow irrigated; bermudagrass infested plots were sprinkler irrigated. After the weeds had been allowed to become established for three years, three levels of weed control were maintained. Complete weed control was obtained by using paraquat and simazine. Partial (50%) weed control was obtained by using paraquat only. No weed control plots had no herbicide weed control. Photosynthesis was measured monthly with a double isotope porometer. Chlorophyll concentration was measured monthly with a portable reflectance meter.

Chlorophyll content of tree leaves was not altered by annual weeds (either furrow or sprinkler irrigated); however, bermudagrass competition resulted in reduced chlorophyll content of tree leaves. In areas with annual weeds, photosynthesis was lower for tree leaves only where there was no weed control. When the competitive vegetation was bermudagrass, photosynthesis was reduced in leaves of trees in areas where control was either partial or absent. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Photosynthetic rate and chlorophyll concentrations of leaves from 'Valencia' orange trees grown with different methods of irrigation, weed vegetation, and levels of weed control[z]

Irrigation	Vegetation	Control level	Control %	Photosynthesis ($MgCO_2dm^{-1}hr^{-2}$)	Chlorophyll content (%)
Furrow	Annual weeds	None	0	2.1a	0.6a
		Partial	50	4.5b	0.6a
		Complete	100	4.5b	0.6a
Sprinkler	Annual weeds	None	0	2.0c	0.6b
		Partial	50	4.5d	0.6b
		Complete	100	4.6d	0.6b
Sprinkler	Bermudagrass	None	0	1.5e	0.5c
		Partial	50	3.7f	0.6d
		Complete	100	4.6g	0.6d

[z]Mean seperation within columns (for each irrigation-vegetation combination) by Duncan's multiple range test, 5% level.

Effects of weeds on the soil moisture and water stress in a 'Valencia' orange orchard. Jordan, L. S., J. L. Jordan, R. Krueger, and C. M. Jordan. The effects of weed on water use by 'Valencia' orange trees and soil moisture were investigated in a 14 year old 'Valencia' orange orchard. The two weed populations used in this research consisted of either annual weeds (*Amaranthus* spp., *Chenopodium* spp., *Conyza* spp., *Cirsium vulgare*, *Bromus* spp., and *Hordeum* spp.) or bermudagrass (*Cynodon dactylon* cv. 'Tifway'). Annual weed infested plots were either sprinkler or furrow irrigated; bermudagrass infested plots were sprinkler irrigated. After the weeds had been allowed to become established for three years, three levels of weed control were maintained. Complete weed control was obtained by using paraquat and simazine. Partial (50%) weed control was obtained by using paraquat only. No weed control plots had no herbicide weed control.

Soil moisture was measured using a neutron moisture probe. Measurements were made at two week intervals at 23, 46, and 92 cm depths midway between the trees in line with the trunks. Water status of the trees was determined by measuring the leaf water potential with a pressure chamber at predawn and midday.

Increased levels of weed control generally increased soil moisture at all three depths. The differences were most pronounced at the 23 cm depth. *Citrus* trees are shallow rooted; thus, they cannot draw on deeper reserves of soil moisture (below the root zones of the weeds). Leaf water potentials increased (became more negative) when the weeds were controlled, indicating that the trees were less stressed when weeds were controlled; this occured for all treatments, both predawn and midday.

Due to adequate irrigation, the reductions in soil moisture and leaf water potential due to weeds were relatively small. If water was limiting, the differences would be more pronounced and associated effects (yield reduction, fruit quality reduction, etc.) would be greater. Increased water use due to weeds results in increased expenses for the grower and increased use of what is often a scarce rescource in arid and semi-arid regions. (Department of Botany and Plant Sciences, University of California, Riverside, California).

Soil moisture at three depths and leaf water potential (1981) in a 'Valencia' orange orchard with different methods of irrigation and weed vegetation, and three levels of control

Irrigation	Vegetation	Control level	%	Soil Moisture (%) Depth (cm) 28	46	92	Leaf water potential (-bars) Predawn	Midday
Furrow	Annual weeds	None	0	16.8a[z]	26.0g	33.5m	5.5a	12.7i
		Partial	50	1717ab	27.2gh	34.2m	5.5a	12.5i
		Complete	100	19.6b	27.6h	33.5m	4.6b	11.0j
Sprinkler	Annual weeds	None	0	13.3c	22.3i	26.9n	5.5c	12.3k
		Partial	50	17.7cd	25.7ij	28.9no	4.6d	12.1k
		Complete	100	20.3d	27.4j	31.3o	3.0e	11.01
Sprinkler	Bermudagrass	None	0	16.4e	24.7k	29.6p	5.8f	12.7m
		Partial	50	19.3f	25.1k	29.6p	5.4g	12.5m
		Complete	100	20.3f	27.41	31.3q	5.0h	11.0n

[z]Mean separation within columns (for each irrigation-vegetation combination) by Duncan's multiple range test, 5% level.

Effects of weeds on 'Valencia' orange tree growth and yield. Jordan, L. S., J. L. Jordan, R. C. Russell, R. Krueger, and C. M. Jordan. The effects of weeds on tree growth and yield of 'Valencia' orange trees were investigated in a 14 year old 'Valencia' orange orchard. The two weed populations used in this research consisted of either annual weeds (*Amaranthus* spp., *Chenopodium* spp., *Conyza* spp., *Cirsium vulgare*, *Bromus* spp., and *Hordeum* spp.) or bermudagrass (*Cynodon dactylon* cv. 'Tifway'). Annual weed infested plots were either sprinkler or furrow irrigated; bermudagrass infested plots were sprinkler irrigated. After the weeds had been allowed to become established for three years, three levels of weed control were practiced. Complete weed control was obtained by using paraquat and simazine. Partial (50%) weed control was obtained by using paraquat only. No weed control plots had no herbicide weed control.

Tree size was measured in October by determining the trunk circumference 10 cm above the bud union and by calculating the tree volume from the height and width of the canopy. Total leaf area was determined from the number of leaves per tree and leaf area measurements.

Increased control of either annual weeds or bermudagrass resulted in more tree growth and larger trees. The volume of trees in areas with complete weed control was almost double that of trees in areas with no weed control. Trunk circumference was always greatest for trees with complete weed control. Leaf area per tree was much less for trees in areas with no weed control than for trees in areas with weed control. Trees grown with complete weed control had the largest leaf areas. Bermudagrass reduced leaf area per tree more than did annual weeds. The greatest benefit from weed control occured when bermudagrass had been the competitive vegetation.

Partial control of weeds did not uniformly affect the factors representing tree growth. The results of partial weed control varied according to tree growth parameter measured, type of weedy vegetation, and method of irrigation. Generally, however, for each measurement, trees were largest with complete weed control, smaller with partial weed control, and smallest with no weed control.

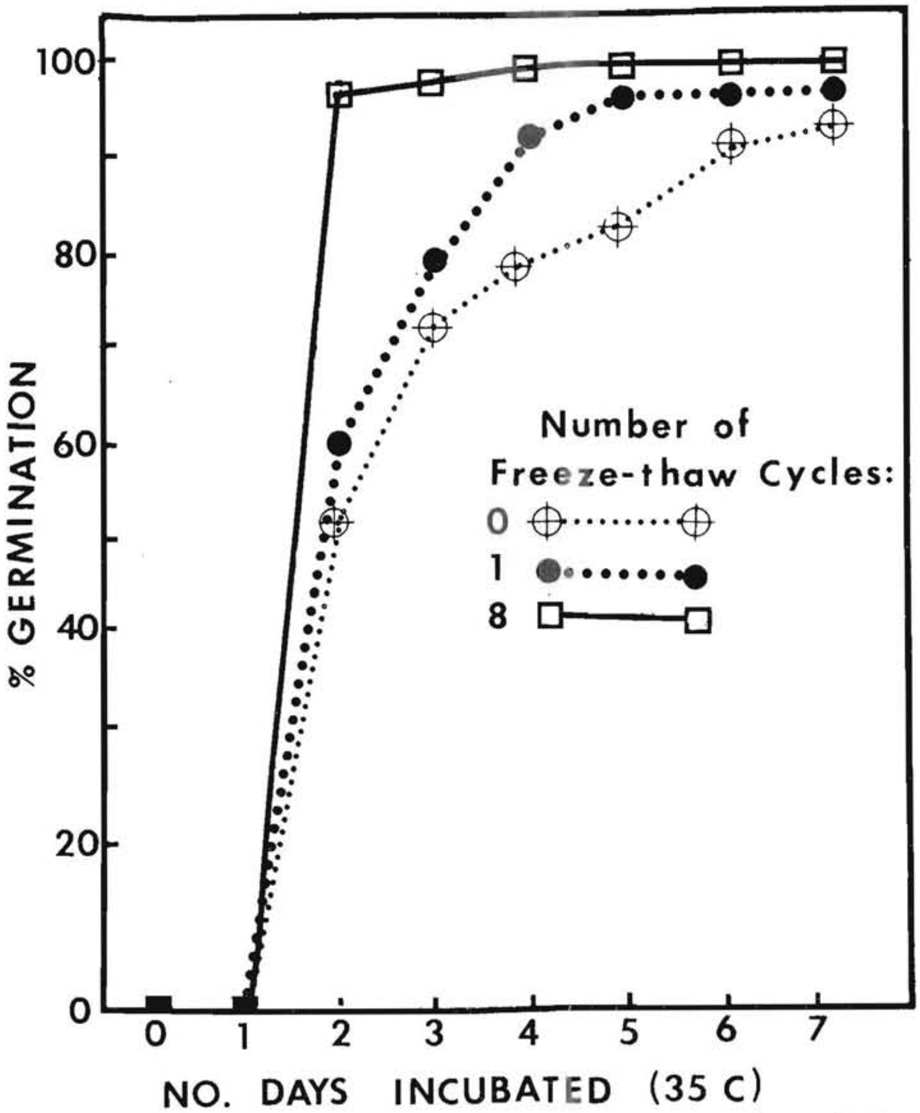
Yield was reduced by weed competition in both partial control and no weed control plots. The reduction was greater in the plots with no weed control. Yield reduction was greater from bermudagrass than from annual weeds. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Tree size and yield of 'Valencia' orange trees grown with different methods of irrigation, kinds of weed vegetation, and levels of weed control

Irrigation	Vegetation	Control level	Control %	Tree Volume (hl)	Trunk Circum (cm)	Leaf area/ tree (cm^2)	Fruit Yield kg/tree
Furrow	Annual weeds	None	0	162a[z]	41.7h	2145o	31.3a
		Partial	50	200ab	42.9h	3243p	54.6b
		Complete	100	291b	48.2i	5136q	59.8c
Sprinkler	Annual weeds	None	0	273c	42.7j	2338r	28.7d
		Partial	50	254cd	46.5k	3840s	49.8e
		Complete	100	297d	48.4k	6845t	66.9f
Sprinkler	Bermudagrass	None	0	160e	41.1m	1445u	15.0g
		Partial	50	219f	44.9n	3388v	33.0h
		Complete	100	297g	48.4o	6845w	66.9i

[z]Mean seperation within columns (for each irrigation-vegetation combination) by Duncan's multiple range test, 5% level.

Repeated low temperature freezing and subsequent thawing on redroot pigweed seeds. Jordan, James L. The effects of repeated low temperature freezing and subsequent thawing on redroot pigweed seed germination were investigated. Redroot pigweed seeds were repeatedly frozen in liquid nitrogen (-196 C) and thawed for one hour in 23 C air. After 0, 1. or 8 freeze-thaw cycles, 1,000 seeds (in 100-seed replicates) from each freeze-thaw regime conducted were incubated between moistened pieces of filter paper at 35 C in the dark. The number of seeds germinated was counted daily for one week. Seeds that had been frozen 8 times had the fastest rate of germination; seeds that had never been frozen and thawed had the slowest rate of germination. Maximum percent germination was similar for seeds frozen and thawed 0, 1, or 8 times. The physiological or mechanical reasons for these results have yet to be determined for redroot pigweed seeds. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).



Percent Redroot pigweed seed germination versus number of days incubated at 35 C between moist filter papers as related to number of freezes and thaws

Italian ryegrass and wild oat competition with wheat for nitrate as indicated by total (above-ground) plant nitrogen. Jordan, L. S., J. L. Jordan, and J. F. Henson. Lath house experiments were conducted to compare Italian ryegrass (*Lolium multiflorum* Lam.) and (*Avena fatua* L.) in monoculture and in competition with wheat (*Triticum aestivum* L. cv. Anza and *T. turgidum* L. durum group cv. Mexicali) at three nitrate concentrations. Plants were grown to maturity in pots containing monocultures of either 10 wheat or weed plants or mixtures of 10 wheat with 10, 25, or a50 weed plants. Nitrate was supplied in 500 ml Hoagland's solution with 1.5, 7.5, or 15.0 mM nitrate as K and Ca nitrate every fourth day.

Total above-ground nitrogen is the product of percent nitrogen of the whole plant and plant weight. The increase in total nitrogen for wild oat and wheat in monoculture was greater when the nitrate concentration was raised from 1.5 to 7.5 mM than when raised from 7.5 to 15.0 mM. In contrast, Italian ryegrass had the greater increase in total nitrogen when the nitrate concentration was raised from 7.5 to 15.0 mM. Wild oat in monoculture had more total nitrogen than Italian ryegrass at each nitrate concentration. The differences between Italian ryegrass and wild oat were more distinct at the two lower nitrate concentrations.

The relationship between Italian ryegrass and wild oat varied when in competition with wheat. In mixtures of wheat with either 25 or 50 weed plants, wild oat had more total nitrogen than Italian ryegrass at the 1.5 and 7.5 mM nitrate concentrations, but not at the 15.0 mM nitrate concentration. In mixtures of 10 wheat and 10 weed plants, wild oat had more total nitrogen than Italian ryegrass at the 1.5 mM nitrate concentration, but less total nigrogen than Italian ryegrass at the 7.5 and 15.0 mM nitrate concentrations. The ranking of the two weeds for total nitrogen in 10 wheat and 10 weed plant mixtures was the reverse of the ranking in monoculture at the 7.5 and 15.0 mM nitrate concentrations. Competition from 10 wheat plants caused a greater percent reduction in the total nitrogen of wild oat than of Italian ryegrass at the 7.5 and 15.0 mM nitrate concentrations. Based on total nitrogen reduction in equal plant mixtures of wheat and weed, Italian ryegrass was more competitive than wild oat at each nitrate level. However, Italian ryegrass ceased to be more competitive than wild oat when the weed density increased at the 7.5 and 15.0 mM nitrate concentrations.

Both Italian ryegrass and wild oat competition always reduced wheat total nitrogen. Italian ryegrass competition caused a greater reduction in wheat total nitrogen than wild oat competition at the 7.5 mM nitrate concentration, but not at the other nitrate concentrations. (Department of Botany and Plant Sciences, University of California, CA 92521).

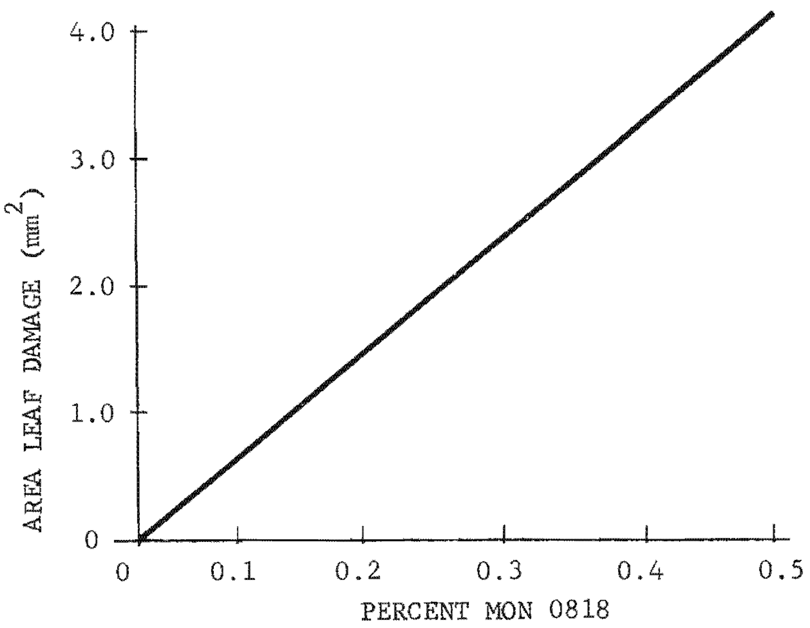
Total (above-ground) plant nitrogen of wheat and two weeds (Italian ryegrass and wild oat) in monoculture and mixtures of wheat with either Italian ryegrass or wild oat at three nitrate concentrations

		Weed				Wheat			
		No. weeds plants	No. weed plants with 10 wheat plants			No. weeds plants	No. weed plants with 10 wheat plants		
Nitrate conc (mM)	Type of competition	10	10	25	50	10	10	25	50
1.5	It. rygr.	199b	125d	159f	170h	145a	102c	78e	76g
	Wild oat	330a	179c	241e	213g	144a	104c	96e	89g
7.5	It. rygr.	645j	530k	538n	636p	1018i	4791	329n	235p
	Wild oat	1353i	4351	792m	9390	1077i	759k	504m	370o
15.0	It. rygr.	1403r	1075a	1173u	1227w	1306q	847s	562u	368w
	Wild oat	1564q	764t	1140u	1259w	1362q	847s	531u	326w

Comparison between Italian ryegrass and wild oats within a column and a nitrate concentration followed by different letters are signifcantly different ($P<0.05$) determined by an L.S.D. test.

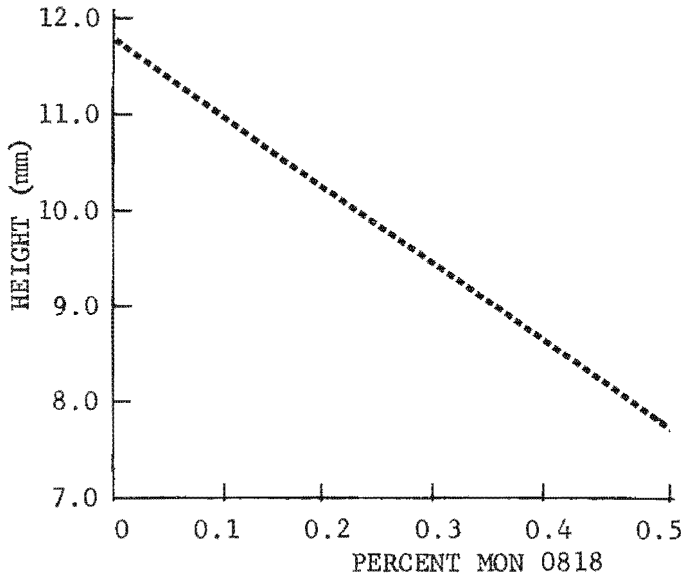
Effect of increasing surfactant concentration on *Sesbania exaltata* cotyledonary leaf damage. Jordan. L. S., J. L. Jordan, and C. M. Jordan. Research was conducted to investigate the effect of increased concentrations of a surfactant (MON 0818) on damage to *Sesbania exaltata* (Rag.) Cory cotyledons. Twenty-five seeds were planted per growth packet (containing 50% Hoagland's solution). Seedlings were thinned to uniform size six days later so that 15 seedlings remained per packet. The seedlings were then sprayed with the appropriate surfactant solution. The necrotic area of the cotyledons was measured 12 days after thinning. Tests were replicated three times. Increased concentrations of surfactant resulted in greater cotyledonary leaf damage. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Effect of increasing surfactant concentration on *Sesbania exaltata* cotyledoonary leaf damage



Effect of increasing surfactant concentration on *Sesbania exaltata* seedling height. Jordan, L. S., J. L. Jordan, and C. M. Jordan. Research was conducted to investigate the effect of increased concentrations of a surfactant (MON 0818), on *Sesbania exaltata* (Raf.) Cory seedling height. Twenty-five seeds were planted per growth packet (containing 50% Hoagland's solution). Seedlings were thinned to uniform size six days later so that 15 seedlings remained per packet. The seedlings were then sprayed with the appropriate surfactant solution. The plant heights were measured 12 days after thinning. Tests were replicated three times. Increased concentrations of surfactant resulted in decreased plant height. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Effect of increasing surfactant (MON 0810) concentration on *Sesbania exaltata* seedling height



The effect of light and glyphosate on Sesbania exaltata root formation. Jordan, L. S., J. L. Jordan, and C. M. Jordan. *Sesbania exaltata* (Raf.) Cory seedlings were sprayed with either 10^{-5} M or 10^{-6} M glyphosate and grown in either light or complete darkness; these tests were performed to investigate the effect of light and glyphosate on *Sesbania exaltata* root formation. Twenty-five seeds were planted per growth packet (containing 50% Hoagland's solution). Seedlings were thinned to uniform size six days later so that 15 seedlings remained per packet. The seedlings were then sprayed with the appropriate solution and either left in the light or placed in complete darkness. Tests were replicated three times. Increased glyphosate concentration had the greatest effect on the number of secondary roots of plants left in the dark. In general, glyphosate tended to adversely affect primary root length, number of secondary roots, and weight of primary and secondary roots (combined). The reduction was greater in the light than in darkness. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Effect of light and glyphosate on *Sesbania exaltata* root formation

Chemical and Conc	Light condition	Primary root length (cm)	Number of 2° roots	Weight of 1° and 2° roots (g)
Glyphosate (10^{-5} M)	Dark	3.9	17	0.19
Glyphosate (10^{-5} M)	Light	3.5	14	0.18
Glyphosate (10^{-4} M)	Dark	3.8	12	0.14
Glyphosate (10^{-4} M)	Light	3.2	6	0.13
H_2O	Dark	12.1	26	0.32
H_2O	Light	7.4	13	0.20

Effect of putrascene on glyphosate activity on *Sesbania exaltata* seedlings. Jordan, L. S., J. L. Jordan, and C. M. Jordan. Research was conducted to investigate the effect of putrascene on glyphosate activity on week-old *Sesbania exaltata* (Raf.) Cory seedlings. Twenty-five seeds were germinated in each growth packet and thinned to 15 uniform seedlings after three days. One week after germination, 25 ml of the appropriate treatment solution was added to each growth packet. Four days after the appropriate solution (containing putrascene and/or glyphosate) had been added, primary root length, shoot height, and number of pinnate leaves were determined. Tests were replicated three times. Plants were kept in a growth chamber.

Putrascene reduced the effect of glyphosate on root length, shoot length, and number of pinnate leaves. The actual physiological basis for these results has yet to be determined. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Effect of putrascene on glyphosate activity on *Sesbania exaltata* seedlings

Chemical (conc) (M)		Roots	Shoot	Pinnate
Putrascene	Glyphosate	(cm)	height (cm)	leaves (no)
0	0	16.5	16.7	3.1
10^{-5}	0	16.8	15.2	3.0
5×10^{-5}	0	15.4	16.7	2.8
10^{-4}	0	15.8	15.4	2.9
10^{-5}	10^{-4}	15.1	15.1	2.8
5×10^{-5}	10^{-4}	16.3	14.4	3.0
10^{-4}	10^{-4}	16.3	17.6	2.8
0	10^{-4}	10.4	15.8	2.4

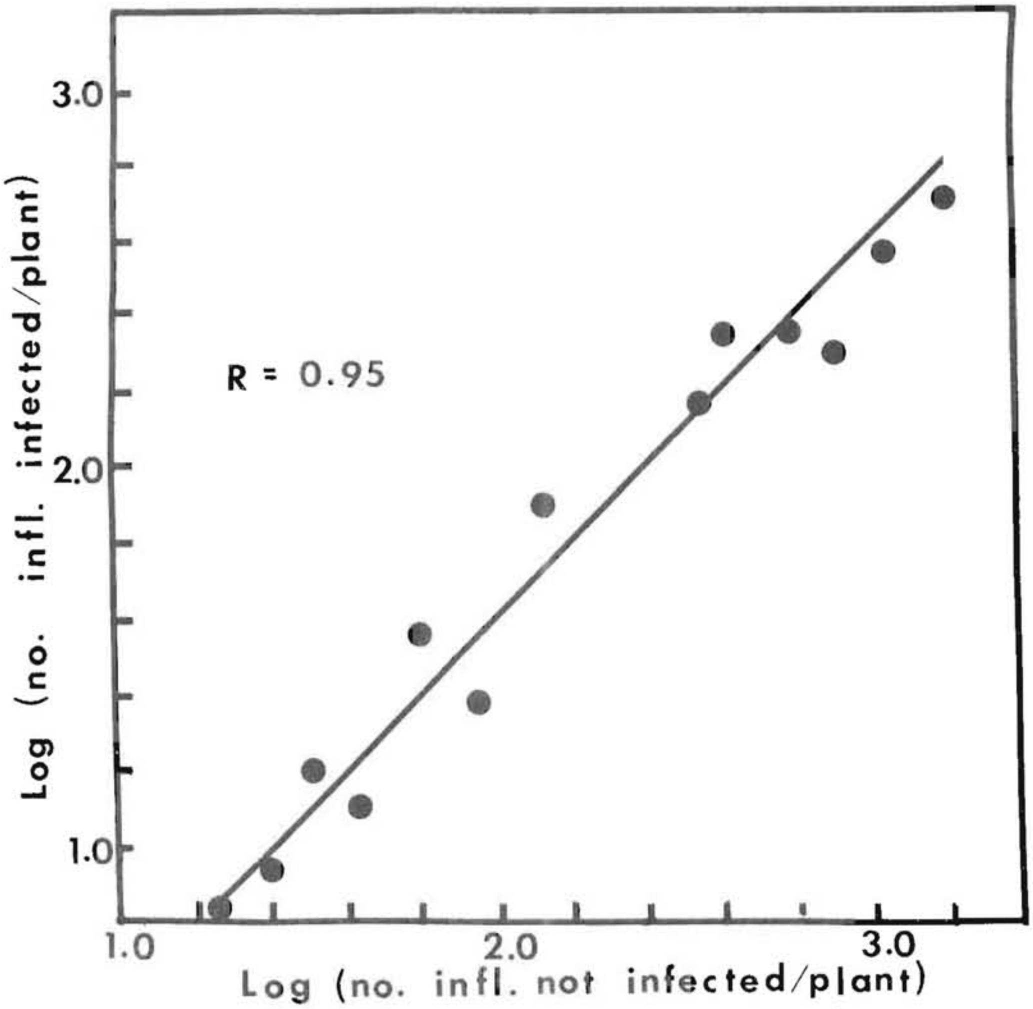
The effects of glyphosate and surfactant concentrations on the primary leaf area of Sesbania exaltata. Jordan, L. S. and J. L. Jordan. Research was conducted to investigate the effect of increased surfactant concentrations (MON 0818) on glyphoate activity (as determined by the first pinnate leaf area of Sesbania exaltata [Rag.] Cory). Seven-day-old seedlings were sprayed with the appropriate solution. The area of the first pinnate leaf area was then determined. The experiments were repeated in time.

Increased surfactant concentration resulted in decreased leaf area, indicating enhanced activity of the solution applied. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

The effect of increasing surfactant (MON 0818) concentration on glyphosate (as indicted by the first pinnate leaf area of Sesbania exaltata)

Chemical	Conc	First pinnate leaf area (cm^2)
H_2O	100%	0.251
Glyphosate	10^{-4} M	0.252
Glyphosate + MON 0818	10^{-4} M	0.203
Glyphosate + MON 0818	10^{-4} M	0.007

Ustilago urticulosa and Pennsylvania smartweed (*Polygonum pensylvanicum*) inflorescences. Jordan, James L. and Catalina M. Jordan. *Ustilago urticulosa* is a smut fungus which infects inflorescences of the *Polygonum* genus. During the spring and summer of 1979, *Ustilago urticulosa* was prevalent in portions of Iowa due to plentiful rainfall and high humidity. Because *Ustilago urticulosa* affected many Pennsylvania smartweed plants in some areas in Iowa, studies were conducted to determine if the number of infected inflorescences had an effect on the number of healthy inflorescences on the same plant. Forty plants from each of three locations in Iowa were chosen at random; the number of infected inflorescences and the number of healthy (not infected) inflorescences were counted. The number of infected inflorescences per plant was compared to the number of healthy inflorescences per plant. An increasing number of infected inflorescences per plant did not result in a corresponding decline of the number of healthy inflorescences per plant. Instead, an increasing number of infected inflorescences correlated with an increasing number of healthy inflorescences on the same plant. (Botany and Plant Sciences Department, and the Plant Pathology Department, University of California, Riverside, California 92521).



Relationship between the number of infected inflorescences per plant versus the number of not infected (healthy) inflorescences per plant

Ustilago urticulosa: a disease of Polygonum genera plants. Jordan, J. L., and C. M. Jordan. Ustilago urticulosa is a smut fungus that has been found to infect the inflorescences of several species in the Polygonum genus; these species are also weeds in several areas. Ustilago urticulosa has not, however, yet been found to be injurious to plants outside of the Polygonum genus. In one study, Ustilago urticulosa infected an average of 28.4 per cent of the inflorescences of infected Polygonum pensylvanicum (Pennsylvania smartweed) plants; the range of infected inflorescences per plant was from 4.5% to 85% of the inflorescences on a Pennsylvania smartweed plant. Thus, Ustilago shows considerable promise as a biological control agent for members of the Polygonum genus. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Polygonum spp. attacked by Ustilago urticulosa

Latin name	Common name (WSSA)
P. acare	Bitter smartweed
P. aviculare	Prostrate knotweed
P. coccineum	Swamp smartweed
P. hydropiper	Marshpepper smartweed
P. hydropiperoides	Mild smartweed
P. lapathifolium	Pale smartweed
P. pensylvanicum	Pennsylvania smartweed
P. persicaria	Ladysthumb

The effect of crop competition on Pennsylvania smartweed seed dormancy. Jordan, J. L. L. S. Jordan, and C. M. Jordan. Pennsylvania smartweed achenes were collected from smartweed plants growing with maize, soybean, or no-crop competition to investigate differences in the achenes and the seeds. Maize competition did not affect the fresh weight, achene thickness, or the volume of Pennsylvania smartweed achenes (Table 1). Achenes (dry, dehiscent one-seeded fruits) were incubated for one week in the dark at 35°C to germinate the seeds. More seeds from plants without crop competition germinated than did seeds from plants with either maize or soybean competition. Fewer seeds from plants with soybean compeition germinated than did seeds from plants with either maize or no-crop competition (Table 2). The nature of competition that a weed endures should therefore be considered when making either dormancy or germination tests. (Department of Botany and Plant Sciences, University of California, Riverside, CA 02521).

Table 1. Fresh weight, thickness, and volume of Pennsylvania smartweed achenes taken from plants grown either with or without maize competition

Parameter	Germination	
	+ Maize	- Maize
Weight (wet) (g)[a]	34.0 ± 1.3	34.4 ± 1.6
Thickness (mm)	0.989 ± 0.022	0.982 ± 0.018
Volume (ml)[a]	29.5 ± 1.4	30.8 ± 0.9

[a]Per 5,000 achenes

Table 2. Germination of Pennsylvania smartweed as affected by crop competition with the parent plants

Kind of crop competition	Location collected	Year collected	Percent germination
None	Ames, Iowa	1976	68.9
None	Ames, Iowa	1977	41.0
None	Ames, Iowa	1979	14.7
Maize	Ames, Iowa	1979	3.9
Maize	Ames, Iowa	1979	4.6
Soybeans	Nashua, Iowa	1979	1.6

Aging effects on Pennsylvania smartweed seed germination. Jordan, J. L. L. S. Jordan, and C. M. Jordan. Research was conducted to investigate the effects of aging on Pennsylvania smartweed seed germination. Seeds were germinated for one week at 35°C. Germination tests consisted of 500 seeds (in 100-seed replicates) and were repeated three times. All freshly harvested seeds were dormant. Other seeds had been sorted at 2°C at low humidity for up to four years before germinating. Increased age tended to result in increased germination. Thus, length of storage may be an important factor in either germination or dormancy research. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521.

Germination of freshly harvested and stored Pennsylvania smartweed seeds

Collection year	Collection site	Germination	
		Freshly harvested	Stored (years in parenthesis)
		%	
1976	Ames, Iowa	0	68.9 (4)
1977	Ames, Iowa	0	41.0 (3)
1979	Ames, Iowa	0	14.7 (1)

Vegetative growth of Pennsylvania smartweed and velvetleaf as affected by maize competition. Jordan, James L. The vegetative growth of Pennsylvania smartweed and velvetleaf as affected by maize competition was investigated in a two-year study in Iowa. During May 1979 and May 1980, plots at two locations were designed so that some weeds would grow without competition from maize and other weeds would grow with severe maize competition. During mid-August 1979 and mid-August 1980, the following parameters were measured: height (in cm) number of branches per plant, and stem diameter at the soil line (in cm). Weeds grown with maize competition had increased heights; however, they also had reduced number of branches per plant and decreased stem diameter at the soil line. More research is needed to better understand the competitive effects of crops (i.e. maize) on weeds. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Vegetative growth of Pennsylvania smartweed as affected by maize competition

Parameter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Height (cm)	71 ± 9	170 ± 8	+147
Branches (No)	274 ± 27	5 ± 4	-99
Stem dia (cm) (soil line)	2.2 ± 0.5	1.0 ± 0.1	-61

Vegetative growth of Velvetleaf as affected by maize competition

Paramaeter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Height (cm)	154 ± 9	176 ± 9	+14
Branches (No)	18 ± 5	1 ± 0	-93
Stem dia (cm) (soil line)	3.4 ± 1.2	1.0 ± 0.3	-71

Reproductive parameters of Pennsylvania smartweed and velvetleaf as affected by maize competition. Jordan, James L. Different reproductive parameters of Pennsylvania smartweed and velvetleaf, as affected by maize competition, were investigated in a two-year study in Iowa. During May 1979 and May 1980, plots at two locations were designed so that some weeds would grow without maize competition and other weeds would grow with severe maize competition. During mid-August 1979 and mid-August 1980, the following parameters were measured: number of inflorescences per plant, seeds per inflorescence, inflorescence length (for Pennsylvania smartweed plants), and pod diameter (for velvetleaf plants). Weeds grown with maize competition had a reduction in reproductive capabilities; the exception to this was that pod diameter, for velvetleaf plants, did not differ between plants either grown with or without maize competition. More research is needed to better understand the competitive effects of maize on weeds. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Reproductive parameters of Pennsylvania smartweed plants as affected by maize competition

Parameter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Inflorescences (no)	217 ± 24	6 ± 4	-97
Flrs. or frt. (per infl.)	62 ± 6	34 ± 5	-45
Infl. length (cm)	4.2 ± 1.4	3.3 ± 1.3	-21

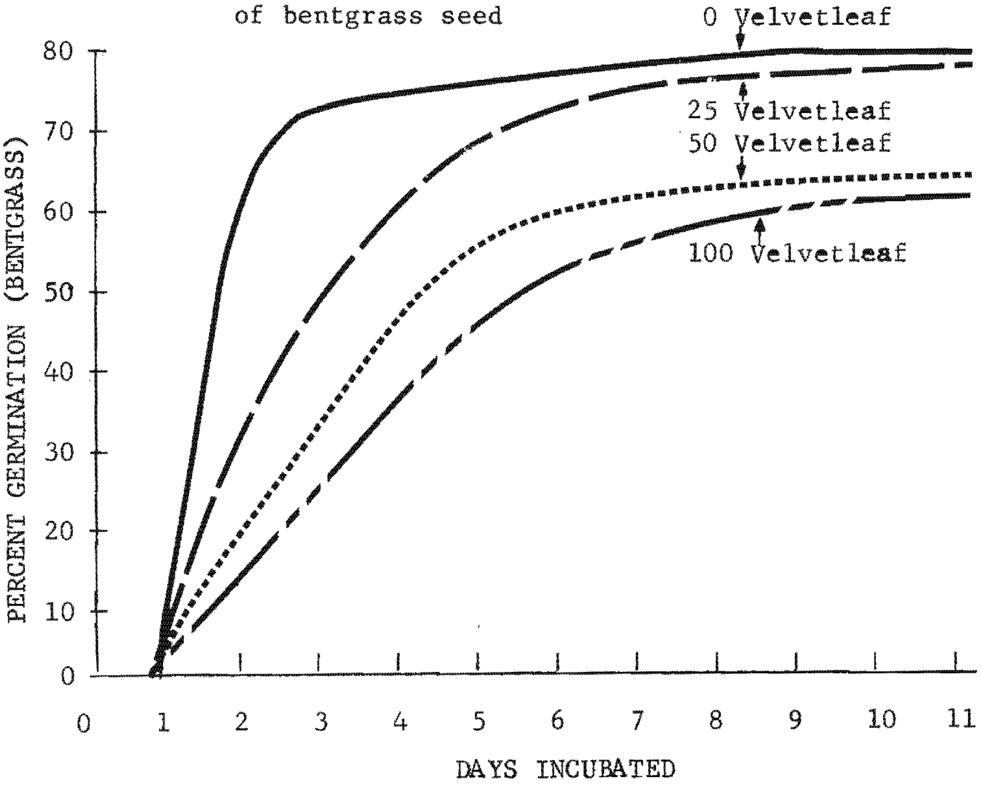
Reproductive parameters of velvetleaf plants as affected by maize competition

Parameter Measured	Without maize Competition	With maize Competition	Change (Reduction -; Increase +)
			%
Inflorescences or pods (no)	352 ± 28	35 ± 10	-90
Seeds (no) (per pod)	15 ± 1	14 ± 1	-7
Pod diameter (cm)	2.2 ± 1.2	2.2 ± 1.3	0

The allelopathic effect of velvetleaf seeds on bentgrass seeds. Jordan, L. S., J. L. Jordan, and C. M. Jordan. The allelopathic effect of velvetleaf seeds on bentgrass seed germination was investigated. Germination tests were performed for 7 days in petri dishes under controlled conditions. One hundred bentgrass seeds were incubated with 0, 25, 50, or 100 velvetleaf seeds. Velvetleaf seeds were removed when they germinated. Velvetleaf seeds, collected in Iowa, were used. Each test had five replications. Each experiment was repeated three times.

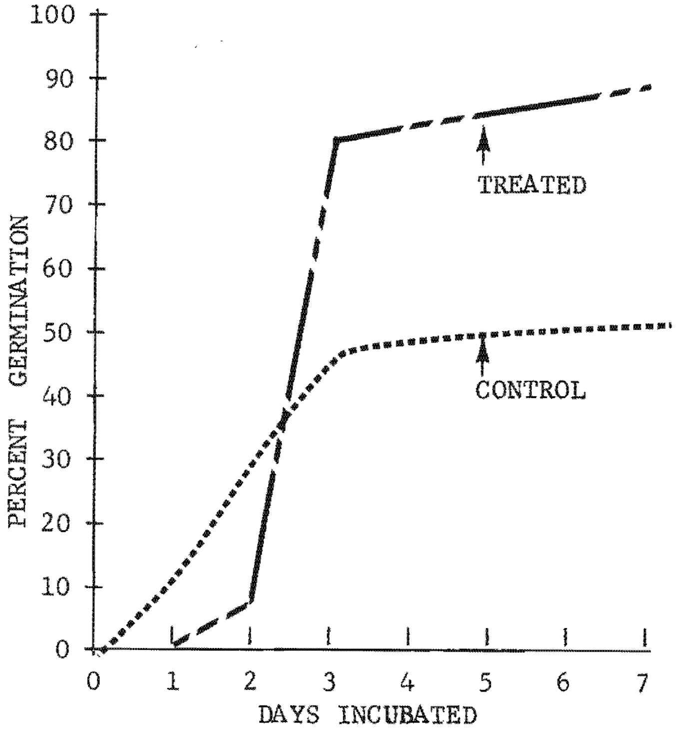
Increasing the number of velvetleaf seeds, in relation to the number of bentgrass seeds present, reduced the number of bentgrass seeds which germinated. The allelopathic substance(s) of velvetleaf were not identified. (Department of Botany and Plant Sciences, University of California, Riverside, California 92521).

Effect of different numbers of velvetleaf seed on the germination of bentgrass seed



Effect of boiling water on velvetleaf seed germination. Jordan, J. L., L. S Jordan, and C. M. Jordan. Velvetleaf (*Abutilon theophrasti* Medic.) seeds were dipped in boiling water for 60 seconds to investigate velvetleaf seed germination. Germination tests were performed for seven days in petri dishes under controlled conditions. Velvetleaf seed had been collected at four locations (during different years) in Iowa. Five hundred seeds (in 100-seed replicates) were used in each test. The experiment was repeated three times. The boiling water treatment greatly increased velvetleaf germinability. Thus, velvetleaf seed dormancy may be related to its seed coat. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

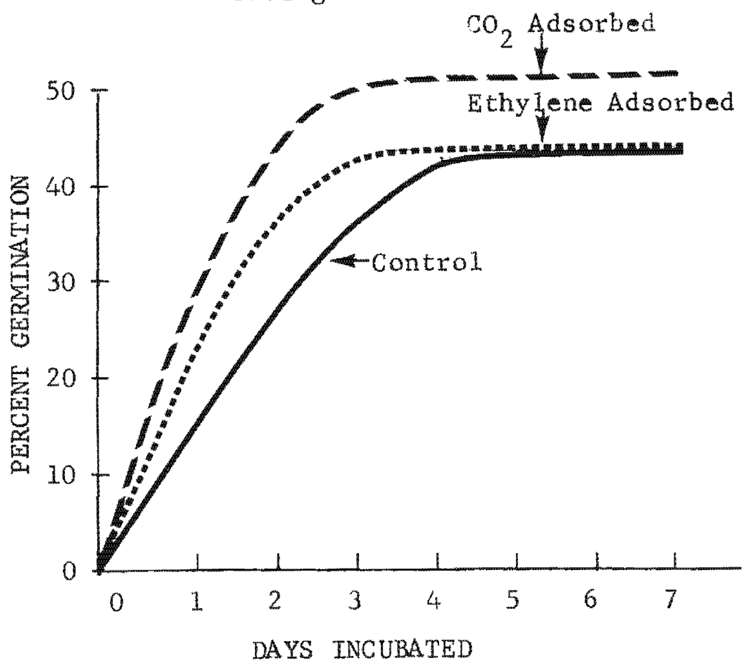
The effect of boiling water on velvetleaf seed germination



The effect of ethylene and CO^2 levels on velvetleaf seed germination. Jordan, L. S., J. L. Jordan, and C. M. Jordan. The effects of either reduced ethylene or CO_2 levels on velvetleaf seed germination were investigated. Germination tests were performed for seven days in petri dishes under controlled conditions. Velvetleaf (*Abutilon theophrasti* (Medic.) seed had been collected at four locations (during different years) in Iowa. Seeds were germinated in 308 cm^3 petri dishes. Five hundred seeds (in 100-seed replicates) were used in each test. The adsorbents were placed in a well in the center of the petri dish. Purofoil was used to adsorb ethylene. Ascorite was used to adsorb CO_2. Both experiments were repeated three times.

Diminished CO_2 levels resulted in increased velvetleaf germination. Also, diminished ethylene and CO_2 levels resulted in a faster rate of germination during the first two days of incubation. Decreased ethylene levels did not change the maximum germination achieved (as compared to the controls). (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

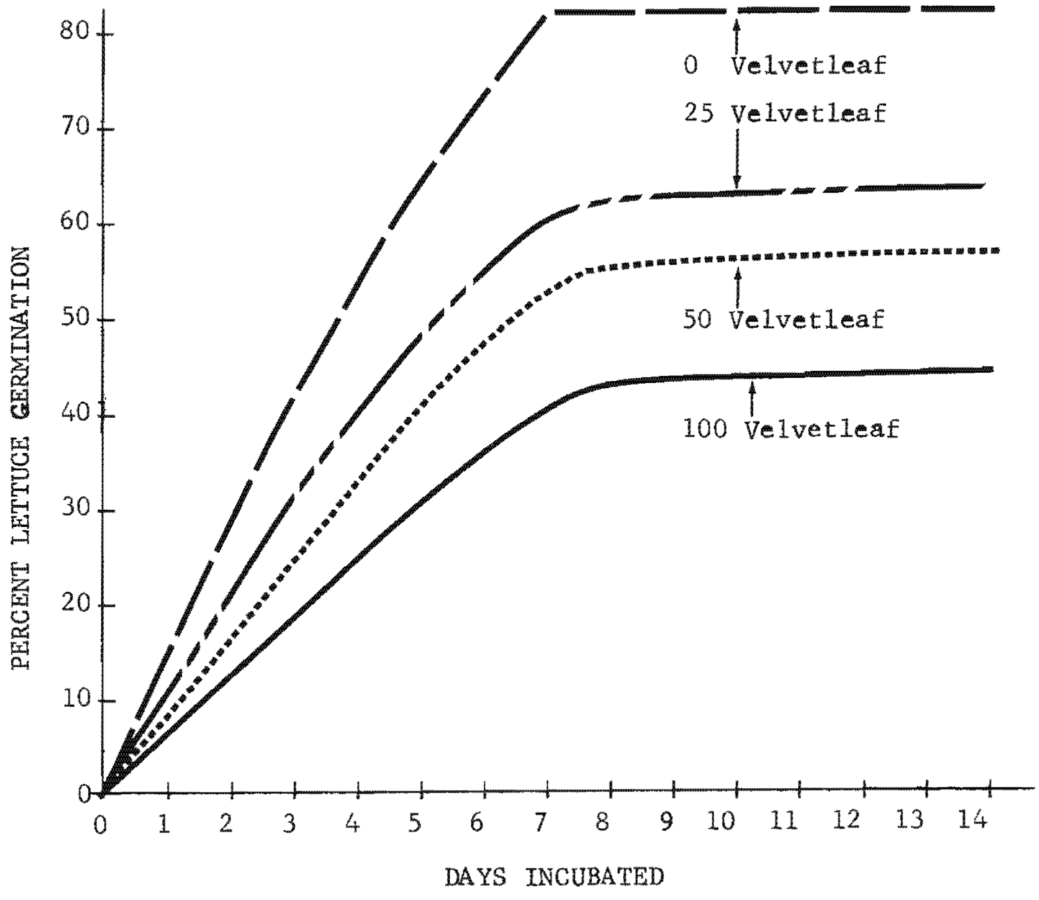
The effect of either diminished ethylene or CO_2 levels on velvetleaf seed germination.



The allelopathic effect of velvetleaf seeds on lettuce seeds. Jordan, J. L., L. S. Jordan, and C. M. Jordan. The allelopathic effect of velvetleaf (*Abutilon theophrasti* medic.) seeds on lettuce seed germination was investigated. Germination tests were performed for 7 days in petri dishes under controlled conditions. One hundred lettuce seeds were incubated with 0, 25, 50, or 100 velvetleaf seeds. Velvetleaf seeds were removed when they germinated. Velvetleaf seeds that had been collected in Iowa were used. Each test had five replications. Each experiment was repeated three times.

Increasing the number of velvetleaf seeds, in relation to the number of lettuce seeds present, reduced the number of lettuce seeds which germinated. The allelopathic substance(s) of velvetleaf were not identified. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

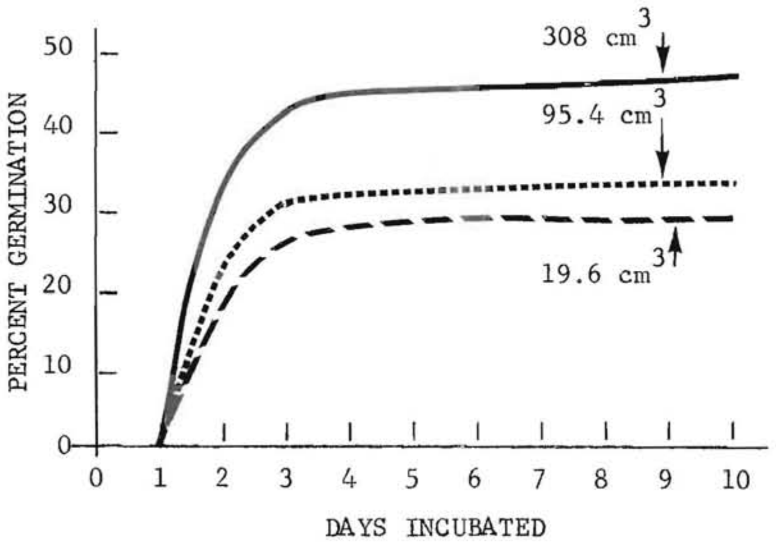
Effect of different numbers of velvetleaf seed on the germination of lettuce seed



Container volume effects on velvetleaf seed germination. Jordan, J. L., L. S. Jordan, and C. M. Jordan. The effect of differing petri dish sizes on velvetleaf seed germination was investigated. The velvet leaf (*Abutilon theophrasti* Medic.) seed used in this research had been collected at four locations (during different years) in Iowa. Five hundred seeds (in 100-seed replicates) were used in each test. Seeds were germinated in petri dishes with the following volumes (filter paper areas are in parenthesis): 308 cm^3 (154 cm^2), 95.4 cm^3 (63.6 cm^2), and 19.6 cm^3 (19.6 cm^2). Experiment was repeated in time.

Germination of velvetleaf seeds in the smallest petri dishes was greater than the germination of velvetleaf seeds in either the medium or large size petri dishes. Velvetleaf seed germination in medium and large size petri dishes was similar. The physiological basis for an interspecific interaction of velvetleaf seeds has yet to be determined. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Germination of velvetleaf seeds in different size petri dishes



Long distance shipping and velvetleaf seed germination. Jordan, J. L., L. S. Jordan, and C. M. Jordan. The effect of transporting velvetleaf (*Abutilon theophrasti* Medic.) seeds by air across the United States was investigated. Seeds that had been collected at two locations were either shipped to California as part of the luggage or as a hand-carried item. Germination was performed for seven days in petri dishes under controlled conditions. Five hundred seeds (in 100-seed replicates) were used in germination tests of seeds that had been transported by either method. Germination tests were repeated three times.

Seed that had been hand carried had higher germination than did seed which was shipped with the luggage. Thus, it is important to know the method by which seeds are transported, especially if the seeds are going to be used for seed germination research. It may be preferable to ship seeds by land or hand carry than by air freight. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Effect of type of air shipment on velvetleaf seed germination

	Method of transport	
Year seed collected	Hand carried	Shipped with freight
1976	52	15
1979	35	29

Wild oat and 'Anza wheat competition for nitrate as indicated by plant weight. Jordan, L. S., J. L. Jordan, and J. F. Henson. Lath house experiments were conducted to compare the effect of wild oat (*Avena fatua* L.) competition on wheat (*Triticum aestivum* L. cv. Anza) at three nitrate concentrations. Plants were grown to maturity in pots containing 10 wheat or wild oat plants, or mixtures of 10 wheat and 10, 25, or 50 wild oat plants. Nitrate was supplied in 500 ml Hoagland's solution with 1.5, 7.5, or 15.0 mM nitrate, as K and Ca nitrate, every 4 days.

In monocultures of wild oat, 'Anza' wheat, the plant weight increased more when the nitrate concentration was raised from 1.5 to 7.5 mM than when raised from 7.5 to 15.0 mM. Wild oat plant weight did not increase significantly when nitrate was increased from 7.5 to 15.0 mM. Wild oat competition caused a reduction in weight of wheat plants. The plant weight of wheat, at each level of wild oat competition increased between the 1.5 to 7.5 mM nitrate concentrations; however, the weight of the weight of wheat in competition with wild oats did not increase between the 7.5 to 15.0 mM nitrate concentrations. Wheat in competition with wild oat plants had a decreased in plant weight between the 7.5 and 15.0 mM nitrate concentrations. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Plant weight (above-ground) of wild oats and 'Anza' wheat grown either as monocultures or in mixtures at three nitrate concentrations

		Dry weight[b]			
		Number wild oat or wheat plants	Number wild oat plants with 10 wheat plants		
Nitrate conc (mM)[a]	Species	10	10	25	50
1.5	Wild oats	25.7c	11.8d	18.0e	19.5e
	Wheat	22.7f	15.2g	8.4h	7.3h
7.5	Wild oats	72.4i	25.3j	42.9k	53.8m
	Wheat	64.1n	45.8o	3.16p	20.9g
15.0	Wild oats	73.3r	29.8s	57.7t	65.5rt
	Wheat	70.8w	44.3x	32.1y	16.6z

[a]Concentration added (500 ml) to pot cultures every fourth day.

[b]Means within a row for either wild oats or wheat followed by a common letter do not differ significantly as determined by a Duncan's Multiple Range Test ($P < 0.05$).

Effect of wild oat competition and nitrate concentration on number of fertile culms and grain yield of 'Anza' wheat. Jordan, L. S., J. F. Henson, and J. L. Jordan. Lath house experiments were conducted to compare the effect of wild oat (*Avena fatua* L.) competition on wheat (*Triticum aestivum* L. cv. Anza) at three nitrate concentrations. Plants were grown to maturity in pots containing 10 wheat or wild oat plants, or mixtures of 10 wheat and 10, 25, or 50 wild oat plants. Nitrate was supplied in 500 ml Hoagland's solution with 1.5, 7.5, or 15.0 mM nitrate, as K and Ca nitrate, every 4 days.

Wild oat competition reduced the number of fertile wheat culms at the 7.5 and 15.0 mM nitrate concentrations, but not at 1.5 mM (Table 1). Increased nitrate concentrations stimulated fertile wheat culm production, but this effect was reduced by wild oat competition.

Grain yield for monocultures of 'Anza' wheat doubled between the 1.5 and 7.5 mM nitrate levels, whereas the increase between 7.5 and 15.0 mM was 10% (Table 2). When wheat was grown in competition with wild oat, grain yield increased when nitrate concentration changed from 1.5 to 7.5 mM, but not when it changed from 7.5 to 15.0 mM. Wild oat competition reduced the grain yield of 'Anza'. Wild oat competition negated the increased grain yield resulting from higher nitrate concentrations. (Department of Botany and Plant Sicences, University of California, Riverside, CA 92521).

Table 1. Number of fertile culms of 'Anza' wheat grown either as monocultures or in competition with wild oats at three nitrate concentrations

Nitrate conc (mM)[a]	Number of fertile wheat culms[b]			
	Number wild oat or wheat plants	Number wild oat plants with 10 wheat plants		
	10	10	25	50
1.5	1.2e	1.0f	1.0f	1.1f
7.5	3.9m	2.4n	1.7o	1.3p
15.0	4.1u	2.8v	1.8w	1.2x

[a]Concentration added (500 ml) to pot cultures every fourth day.

[b]Means with a row followed by a common letter do not differ significantly as determined by a Duncan's Multiple Range Test ($P < 0.05$).

Table 2. Grain yield of 'Anza' wheat grown either as monocultures or in competition with wild oats at three nitrate concentrations

Nitrate conc (mM)[a]	Grain yield (g)[b]			
	Number wild oat or wheat plants	Number wild oat plants with 10 wheat plants		
	10	10	25	50
1.5	9.0d	6.0e	3.8f	2.8f
7.5	22.8m	16.3n	11.2o	7.3p
15.0	24.1u	14.9v	12.0v	4.7w

[a]Concentration added (500 ml) to pot cultures every fourth day.

[b]Means with a row followed by a common letter do not differ significantly as determined by a Duncan's Multiple Range Test ($P < 0.05$).

Wild oat and 'Anza' wheat competition for nitrate as indicated by plant nitrogen content. Jordan, L. S., J. F. Henson, and J. L. Jordan. Lath house experiments were conducted to compare the effect of wild oat (*Avena fatua* L.) competition on wheat (*Triticum aestivum* L. cv. Anza) at three nitrate concentrations. Plants were grown to maturity in pots containing 10 wheat or wild oat plants or mixtures of 10 wheat and 10, 25, or 50 wild oat plants. Nitrate was supplied in 500 ml Hoagland's solution with 1.5, 7.5, or 15.0 mM nitrate, as K and Ca nitrate, every 4 days.

Total plant nitrogen was determined by multiplying whole plant percent nitrogen by plant dry weight (Table 1). For all plants grown as monocultures, total plant nitrogen increased more when the nitrate concentration was changed from 1.5 to 7.5 mM than from 7.5 to 15.0 mM. Wild oat competition always reduced total plant nitrogen of wheat. When in competition with wild oats, total plant nitrogen of wheat increased when the nitrate concentration was raised from 1.5 to 7.5 mM; total plant nitrogen of wheat remained the same when the nitrate concentration was raised from 7.5 to 15.0 mM.

For the wild oats and wheat, the increase in whole plant percent nitrogen, from additional nitrate, was greater when the nitrate concentration was raised from 1.5 to 7.5 mM than from 7.5 to 15.0 mM (Table 2). Wild oat competition caused a decrease in the whole plant percent nitrogen of 'Anza' wheat. (Department of Botany and Plants Sciences, University of California, Riverside, CA 92521).

Table 1. Total above-ground plant nitrogen of wild oats and 'Anza' wheat grown either as monocultures or in mixtures at three different nitrate concentrations

		Total nitrogen (mg)[b]			
		Number wild oat or wheat plants	Number wild oat plants with 10 wheat plants		
Nitrate conc (mM)[a]	Species	10	10	25	50
1.5	Wild oats	330e	145q	235f	228f
	Wheat	297e	173f	85g	69g
7.5	Wild oats	1353h	395m	729n	901l
	Wheat	1283h	856l	609m	432n
15.0	Wild oats	1564r	567t	1074s	1192s
	Wheat	1437r	967s	643t	348u

[a]Concentration added (500 ml) to pot cultures every fourth day.

[b]Means within a row for either wild oats or wheat followed by a common letter do not differ significantly as determined by a Duncan's Multiple Range Test ($P < 0.05$).

Table 2. Whole above-ground plant percent nitrogen of wild oats and 'Anza' wheat grown either as monocultures or in mixtures at three different nitrate concentrations

		Percent nitrogen[b]			
		Number wild oat or wheat plants	Number wild oat plants with 10 wheat plants		
Nitrate conc (mM)[a]	Species	10	10	25	50
1.5	Wild oats	1.3de	1.5d	1.3e	1.2e
	Wheat	1.3d	1.0e	1.0e	1.0e
7.5	Wild oats	1.9h	1.6j	1.7j	1.7j
	Wheat	1.9h	1.9h	1.8h	2.1h
15.0	Wild oats	2.2m	1.9n	1.9n	1.8n
	Wheat	2.0n	2.2m	2.0n	2.0n

[a]Concentration added (500 ml) to pot cultures every fourth day.

[b]Means within a row for either wild oats or wheat followed by a common letter do not differ significantly as determined by a Duncan's Multiple Range Test ($P < 0.05$).

Italian ryegrass and wild oat competition for nitrate as indicated by number of fertile wheat culms and grain yield. Jordan, L. S., J. L. Jordan, and J. F. Henson. Lath house experiments were conducted to compare Italian ryegrass (*Lolium multiflorum* Lam. and (*Avena fatua* L.) in monoculture and in competition with wheat (*Triticum aestivum* L. cv. Anza and *T. turgidum* L. durum group cv. Mexicali) at three nitrate concentrations. Plants were grown to maturity in pots containing monocultures of either 10 wheat or weed plants or mixtures of 10 wheat with 10, 25, or 50 weed plants. Nitrate was supplied in 500 ml Hoagland's solution with 1.5, 7.5, or 15.0 mM nitrate as K and Ca nitrate every fourth day.

Both Italian ryegrass and wild oat competition caused a significant reduction in the number of fertile wheat culms at the 7.5 and 15.0 mM nitrate concentrations (Table 4). The reduction in the number of fertile wheat culms was usually the same from Italian ryegrass and wild oat competition.

Both Italian ryegrass and wild oat competition always reduced wheat grain yield. Wild oat competition usually caused a greater reduction in wheat grain yield than Italian ryegrass competition at the 15.0 mM nitrate concentration.

Italian ryegrass had a higher plant weight than wild oat in monoculture and when in competition with wheat. However, the reduction in wheat plant weight and grain yield was not greater from Italian ryegrass competition than from wild oat competition. Italian ryegrass in monoculture had a greater increase in plant weight and total nitrogen when the nitrate concentration was raised from 7.5 to 15.0 mM, whereas wild oat did not. However, wild oat competition prevented an increase in wheat plant weight, total nitrogen, and grain yield when the nitrate concentration was raised from 7.5 to 15.0 mM, whereas wild oat did not. However, wild oat competition prevented an increase in wheat plant weight, total nitrogen, and grain yield when the nitrate concentration was raised from 7.5 to 15.0 mM but Italian ryegrass competition did not. Italian ryegrass competition consistently caused greater reductions in wheat percent nitrogen than wild oat competition, even though Italian ryegrass in monoculture had less total nigrogen than wild oat. (Department of Botany and Plant Sciences, University of California, Riverside, CA 92521).

Plant weight of wheat and two weeds (Italian ryegrass and wild oat) in monoculture and mixtures of wheat with either Italian ryegrass or wild oat at three nitrate concentrations

		Weed				Wheat			
		No. weeds plants	No. weed plants with 10 wheat plants			No. weeds plants	No. weed plants with 10 wheat plants		
Nitrate conc (mM)	Type of competition	10	10	25	50	10	10	25	50
1.5	It. rygr.	1.1a	1.0c	1.0e	1.0g	8.1a	6.0c	4.4e	2.7g
	Wild oat	1.2a	1.0c	1.0e	1.0g	7.5a	5.1c	3.3e	2.6g
7.5	It. rygr.	2.8i	1.5l	1.3m	1.1o	17.8i	12.8k	10.5m	7.8o
	Wild oat	2.9i	2.0k	1.4m	1.1o	19.8i	13.8k	9.6m	6.7o
15.0	It. rygr.	3.3q	2.1s	1.9u	1.4w	19.7q	14.9s	11.5u	8.3w
	Wild oat	3.4q	2.1s	1.5v	1.2w	19.0q	12.1t	9.6u	4.6x

Comparisons between Italian ryegrass and wild oats within a column and a nitrate concentration followed by different letters are significantly different ($P < 0.05$) determined by an L.S.D. test.

Some effects of repeated low temperature freezing and subsequent thawing on weed seed imbibition and dry weight. Jordan, James L. The effects of repeated low temperature freezing and subsequent thawing on common lambsquarters, redroot pigweed, and yellow foxtail seeds water imbibition and dry weight were investigated. Seeds were repeatedly frozen in liquid nitrogen (-196 C) and thawed for one hour in 23 C air. After either 0 or 10 freeze-thaw cycles, 300 seeds (in 100-seed replicates) from each freeze-thaw regime were tested for fresh weight, percent weight increase from imbibition, or percent moisture in seeds which had not imbibed water. Percent weight increase from imbibition was determined from the weight difference of seeds which had not imbibed water and seeds which had imbibed water for 24 hours at 35 C. The dry weight of seeds was determined from the weight difference of seeds which had not imbibed water and seeds which had been in a forced air oven at 105 C for 24 hours. Ten freeze-thaw cycles did not result in differing fresh weights, percent water imbibition, or dry weight from seeds which had never been frozen in liquid nitrogen. More research is needed to determine what the actual effects of low temperature freezing are on weed seed physiology. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

The effects of freezing in liquid nitrogen and subsequent thawing on the fresh weight, water imbibition, and dry weight on the seeds of three weed species

Weed Species	Number of Freeze-Thaw Cycles	Fresh Weight[a] (g)	Water Imbibition[a]	Dry Weight[a]
			%	%
Common Lambsquarters	0	0.147	23.0	5.5
	10	0.138	20.6	7.3
Redroot Pigweed	0	0.090	18.1	10.4
	10	0.092	14.5	9.5
Yellow Foxtail	0	1.626	6.0	5.6
	10	1.658	6.6	6.0

[a]Mean values for 100 seeds.

Seed production of four weed species as affected by maize competition. Jordan, James L. The seed production of green foxtail, Pennsylvania smartweed, velvetleaf, and yellow foxtail as affected by maize competition was investigated in a two-year study in Iowa. During May 1979 and May 1980, plots at two locations were designed so that some weeds would grow without competition from maize and other weeds would grow with severe maize competition. During September 1979 and September 1980, the weed plants were harvested and the number of seeds per weed plant was determined. Maize competition had the least effect on velvetleaf, but had the greatest effect on Pennsylvania smartweed seed production. The nature of the maize competition (as to which factor was most limiting) with the weed plants has yet to be determined. (Botany and Plant Sciences Department, University of California, Riverside, California 92521).

Seed production of four weed species as affected by maize competition

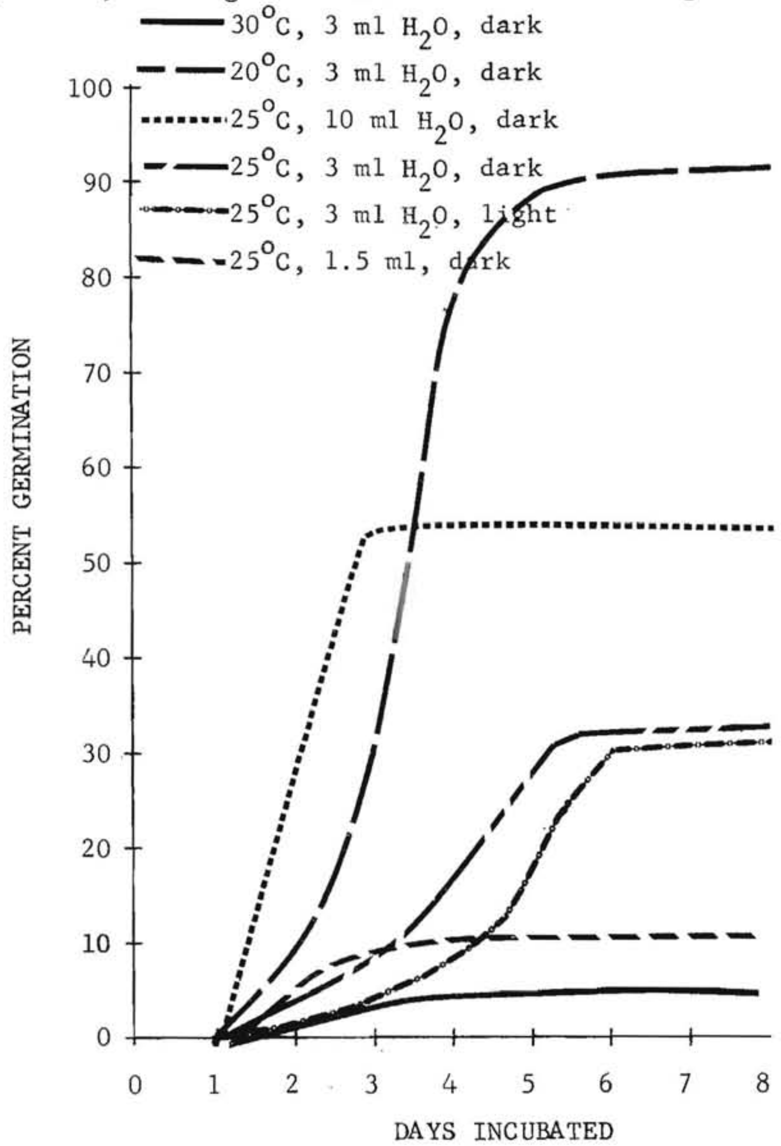
Weed Species	Weed seed production of parent plant[a]		Ratio[b]
	Without maize Competition	With maize Competition	
Green foxtail	23,700	800	13:1
Pennsylvania smartweed	13,400	200	68:1
Velvetleaf	5,300	500	11:1
Yellow foxtail	4,000	300	30:1

[a]Values represent means. The two years and two sites data were pooled.

[b]Ratio of seeds produced for an average weed plant grown without maize competition versus the number of seeds produced for an average weed plant grown with maize competition.

Temperature, moisture and light effects on wild oat germination. Jordan, L. S., J. L. Jordan, and C. M. Jordan. Wild oat (*Avena fatua* L.) seeds were placed on filter paper in petri dishes under continuous light and dark conditions at 20, 25, and 30°C. The cultures were moistened with 10, 3, and 1.5 ml of water as needed. Five replications of 100 seeds were used and tests were repeated. The highest germination was in the dark with 3 ml water at 20°C. Too much (10 ml) and too little water (1.5 ml) and light decreased wild oat seed germination. (Botany and Plant Sciences, University of California, Riverside CA 92521).

Temperature, water, and light effects on wild oat seed germination



HERBACEOUS WEED INDEX

(alphabetically by scientific name)

HERBACEOUS WEED INDEX

(alphabetically by common name)

WOODY PLANT INDEX

CROP INDEX

HERBICIDE INDEX

(by common name or code designation)

This table was compiled from approved nomenclature adopted by the Weed Science Society of America (Weed Science 26(6):1978) and WSSA Herbicide Handbook (4th ed.). "Page" refers to the page where a report about the herbicide begins; actual mention may be on a following page. A herbicide name occupying two or more lines and separated by an equal (=) sign is written as one word when written on one line.)

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 . . . . leter(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