

Department of Crop and Soil Sciences

**Technical Report 98-3**

**1998**

**Eastern Washington**

**Weed Control Report**

**Contributing agencies: Washington State University, U.S. Department of Agriculture and Department of Crop and Soil Sciences.  
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Washington State University

Department of Crop and Soil Sciences

## 1998 Eastern Washington Weed Control Report

Technical Report

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### INTRODUCTION

The information that is enclosed in this report is a summary of herbicide weed control trials that were conducted as a part of the Cooperative Extension Weed Management Project in the dryland cropping region of eastern Washington. The results of each individual trial are considered preliminary and are accompanied by a brief discussion. Because these trials include experimental herbicides, herbicides not currently labeled on the crop, and rates differing from the herbicide label, you need to consult the herbicide label for approved uses, labeled rates, and precautions.

**Because these are preliminary research results, the results in this report are not to serve as herbicide recommendations. Neither the author, Washington State University, nor WSU Cooperative Extension attest or affirm that this information is presently appropriate for field application. Application or use of any information included herein shall be the sole responsibility of the grower.**

These trials were made possible through the efforts, cooperation, and support of many individuals and organizations. I would like to express my appreciation and acknowledge their support. Financial support was provided from the following commodity commissions and private industries.

Washington and Idaho Dry Pea and Lentil Commissions  
Washington State Pesticide Registration Commission

American Cyanimid  
Monsanto  
Zeneca

Agrevo  
Rhone-Poulenc  
Wilbur Ellis

Bayer  
UAP/Northwest Ag.  
McGregors  
DuPont

The cooperation of Washington's growers was also critical in the success of these trials, and I especially want to thank the efforts and generosity of the following cooperators:

Don Renehart	Steve Rosbach	Smith-Chem
Jay Lyman	Bud Aune	Jay Dewitt
Kevin Wigen	Ferrel Brothers	Mark Whitmore
Howard Smith	Keith Kopf	Ron Jirva
C.V. Hughes	Roland Schirman	Darren Fleming
Curt Greenwalt	Walt Gary	Bill Schillinger

The successful completion and summation of these trials were also significantly aided by Kim Hemmesch, Technician Assistant, and Marguerite Winterowd, Office Manager.

#### A Comment on Statistics and LSDs

Statistical analysis is performed on each set of data to determine if the differences between control ratings, yields, etc. are likely due to real effects from the herbicide or just chance variation. Variation can result from non-uniform soil conditions, differences in weed densities across the experiment, errors from using a small plot combine, etc. To reduce variation, each herbicide treatment is replicated or repeated so that its performance can be measured a number of times in the trial. The numbers that appear in the data tables for each measurement, such as yield or weed control, are the average of all replications. At the bottom of each table is a row titled LSD (0.05) and includes a number under each column of data. When comparing two herbicide treatments, the control ratings or yields need to differ by more than the LSD value to be "significantly different" from each other. The number 0.05 gives the amount of uncertainty that is associated with the analysis. In this case, there is a 5% chance that there would not be a difference if the trial was repeated and 95% confidence that the difference is real. Some experiments include letters to the side of the data. These letters serve the same purpose of the LSD number. Data with the same letter are not significantly different from each other, but data followed by different letters are different with 95% certainty.

## **RESEARCH RESULTS ARE NOT RECOMMENDATIONS**

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Herbicides that were used in these trials are listed below as both common and trade names:

<u>COMMON NAME</u>	<u>TRADE NAME</u>
2,4-D amine 3.8lb ae/gal	Weedar 64
2,4-D ester 5 lb ae/gal	Salvo
2,4-D 95 DS	Savage
acetochlor	Harness
BAY FOE-5043	Axiom
bentazon	Basagran
bromoxynil	Buctril
bromoxynil + MCPA	Bronate
bromoxynil + MCPA	Broclean
chlorsulfuron + metsulfuron	Finesse
clethodium	Prism/Select
clopyralid	Stinger
clopyralid + 2,4-D	Curtail
cloransulam methyl	First Rate
dicamba	Banvel/Clarity
diclofop	Hoelon
difenzoquat	Avenge
dimethenamid	Frontier
fenoxaprop	Horizon
fenoxaprop + 2,4-D + MCPA	Tiller
fenoxaprop + MCPA ester + thifensulfuron + tribenuron	Cheyenne
fenoxaprop + safener	Puma
flumetsulam	Python
flumichlorac	Resource
fluoxypyr	Starane
fomesafen	Reflex
fosamine ammonia	Krenite
glyphosate	Round-upUltra
glyphosate + 2,4-D amine	Landmaster
imazamethabenz	Assert

## Herbicide Reference

<u>COMMON NAME</u>	<u>TRADE NAME</u>
imazethapyr	Pursuit
imazamox	Raptor
imazapic	Plateau
isoxaflutole	Balance
metribuzin	Sencor
metsulfuron	Ally
metolachor	Dual
nicosulfuron	Accent
pendimethalin	Prowl
picloram	Tordon
prosulfuron	Peak
pyridate	Tough
quizalofop	Assure II
quinchlorac	Facet
sulfentrazone	Authority
sulfosulfuron	Maverick
thifensulfuron + tribenuron	Harmony Extra
thifensulfuron	Harmony/Pinnacle
tralkoxydim	Achieve
triasulfuron	Amber
tribenuron	Express
trifluralin	Treflan
WSU001	WSU001

## Weed Reference

Weeds within these trials are listed below both as common names and scientific names.

<u>COMMON NAMES</u>	<u>BAYER CODE</u>	<u>SCIENTIFIC NAMES*</u>
brome, downy	BROTE	<i>Bromus tectorum</i> L.
chamomile, mayweed	ANTCO	<i>Anthemis cotula</i> L.
dandelion	TAROF	<i>Taraxacum officinale</i>
fescue, rattail	VLPMY	<i>Vulpia myuros</i> L.
goatgrass, jointed	AEGCY	<i>Aegilops cylindrica</i> Host.
henbit	LAMAM	<i>Lamium amplexicaule</i> L.
kochia	KCHSC	<i>Kochia scoparia</i> (L.) Schrad.
lambsquarters, common	CHEAL	<i>Chenopodium album</i> L.
lettuce, prickly	LACSU	<i>Lactuca serriola</i> L.
mustard, tumble	SSYAL	<i>Sisymbrium altissimum</i> L.
oat, wild	AVEFA	<i>Avena fatua</i> L.
pennycress, field	THLAR	<i>Thlaspi arvense</i> L.
ryegrass, Italian	LOLMU	<i>Lolium multiflorum</i> Lam.
thistle, Russian	SASKR	<i>Salsola iberica</i> Sennen & Pau
ventenata	VETDU	<i>Ventenata dubia</i>
windgrass	APESV	<i>Apera interrupta</i>

\*Scientific name includes genus, species, author(s).

97JPY021 & 022. Effects of preharvest applications of glyphosate on wheat yield and seed quality.

These studies were conducted to determine if preharvest applications of 0.56 and 0.75 lbs. a.e./A glyphosate have any effect on quality of harvested wheat seed germination and seedling quality. Applications were made at various stages of wheat maturity beginning at the milk stage. Alpowa and Penewawa varieties of spring wheat were used to compare potential varietal differences.

In the year of the glyphosate application, wheat yield, test weight, or 100 kernal weight relative to the nontreated check was not affected with the exception of applications made at the milk stage of wheat maturity. Applications made at this time had reduced yield, test weight, and 100 kernal weight. Also, wheat seed germination of Penewawa was reduced with 0.75 lbs. a.e./A glyphosate applied at the milk stage of maturity. Germination percentages for Alpowa were not significantly different at  $p = 0.05$ .

Seed from these plots were planted in the field the following spring. With both varieties, seedling density and height were reduced with seed originating from plots receiving preharvest glyphosate applications at the milk stage of development the previous year regardless of rate relative to the nontreated control. Wheat yields were reduced with both varieties due to an infestation of Hessian fly. Yields were reduced relative to the nontreated control with Penewawa seed originating from treatments receiving either rate of glyphosate at the milk stage of development. Yields were not significantly different at  $p = 0.05$  for Alpowa.<sup>2</sup>

97JPY021. Effects of preharvest applications of glyphosate on Penewawa wheat yield and seed quality.

Location: Pullman  
Cooperator: WSU

Crop Information

Planting Date: 5/5/97  
Row Spacing: 8 in  
Seeding Rate: 80 lbs/A  
Variety: Penewawa

Application Information

	Milk	Soft dough	Hard dough	HD+7d	Preharvest
Date	7/28/98	8/12/97	8/25/97	9/4/97	9/12/97
Air Temperature	87 F	89 F	82 F	70 F	60 F
Relative Humidity	56 %	50 %	45 %	90 %	66 %
Wind Velocity	2 mph	2 mph	8 mph	4 mph	7 mph
Soil Temperature	96 F	110 F	80 F	63 F	59 F
Soil Moisture	dry	dry	dry	moist	dry
Cloud Cover	30 %	60 %	80 %	35 %	55 %
Crop Stage	milk dough	soft dough	hard dough	hd + 7 days	harvest day
Height	4 ft	4 ft	4 ft	4 ft	4 ft
Gal/Acre	10	10	10	10	10
Pressure	34 psi	34 psi	34 psi	34 psi	36 psi
Nozzles	XR8001	XR8001	XR8001	XR8001	XR8001

97JPY022. Effects of preharvest applications of glyphosate on Alpowa wheat yield and seed quality.

Location: Pullman  
Cooperator: WSU

Crop Information

Planting Date: 5/5/97  
Row Spacing: 8 in  
Seeding Rate: 80 lbs/A  
Variety: Alpowa

Application Information

	Milk	Soft dough	Hard dough	HD+7d	Preharvest
Date	7/29/98	8/12/97	8/25/97	9/4/97	9/12/97
Air Temperature	80 F	89 F	80 F	70 F	60 F
Relative Humidity	70 %	50 %	45 %	90 %	66 %
Wind Velocity	1 mph	2 mph	8 mph	4 mph	7 mph
Soil Temperature	76 F	110 F	81 F	63 F	59 F
Soil Moisture	dry	dry	dry	moist	dry
Cloud Cover	95 %	60 %	80 %	35 %	55 %
Crop Stage	milk dough	soft dough	hard dough	hd + 7 days	harvest day
Height	4 ft	4 ft	4 ft	4 ft	4 ft
Gal/Acre	10	10	10	10	10
Pressure	34 psi	34 psi	34 psi	34 psi	36 psi
Nozzles	XR8001	XR8001	XR8001	XR8001	XR8001

97JPY021. Effects of preharvest applications of glyphosate on Penewawa wheat yield and seed quality.

Growth stage	Glyphosate Rate lbs a.e./A	1997 wheat				1998 wheat			
		Yield bu/a	Test wt. lbs/bu	100 seed wt. gms.	Germ. %	Stand density	Plant height	Plant height	Yield bu/a
						June 1 plants/m	June 1 cm	June 22 cm	
NA	0.0	47.8	60.0	4.2	99.0	28.9	16.3	45.0	11.3
Milk	0.56	28.3	55.6	2.8	98.3	16.2	10.3	24.8	5.1
	0.75	26.5	54.5	2.9	95.3	11.7	12.9	30.2	5.8
Soft dough	0.56	44	60.2	4.2	98.8	30.9	16.4	46.3	12.6
	0.75	40.5	59.5	4.1	99.5	22.6	15.0	40.4	10.6
Hard dough	0.56	43.5	59.8	4.2	99.5	33.0	17.2	46.2	15.8
	0.75	42.3	59.7	4.2	99.5	27.6	17.0	43.2	16.4
Hard dough + 7 days	0.56	45	59.9	4.1	99.5	28.4	16.7	46.1	13.0
	0.75	39.4	59.6	4.1	99.5	33.1	17.1	46.4	13.4
1 day preharvest	0.56	47.9	59.8	4.1	99.3	31.2	16.1	45.4	14.4
	0.75	41.5	59.8	4.3	99.8	27.8	16.5	43.8	13.5
LSD (p=0.05)		7.2	0.9	0.2	1.8	8.3	2.1	6.3	5.7

97JPY022. Effects of preharvest applications of glyphosate on Alpowa wheat yield and seed quality.

Growth stage	Glyphosate Rate lbs a.e./A	1997 wheat				1998 wheat			
		Yield bu/a	Test wt. lbs/bu	100 seed wt. gms.	Germ. %	Stand density	Plant height	Plant height	Yield bu/a
						June 1 plants/m	June 1 cm	June 22 cm	
	0.0	45.2	60.2	3.7	98.3	28.2	15.4	39.9	8.7
Milk	0.56	21.5	48.9	2.3	95.5	14.9	10.3	26.0	6.1
	0.75	20.8	49.2	2.3	95.5	12.9	12.3	26.6	5.0
Soft dough	0.56	45.1	60.8	3.7	98.3	24.0	15.6	40.2	8.8
	0.75	47.6	60.2	3.8	99.0	27.6	16.2	40.8	7.2
Hard dough	0.56	45.7	60.5	3.9	96.8	25.8	15.8	41.6	6.9
	0.75	47.0	60.5	3.9	99.0	25.6	15.8	40.2	9.7
Hard dough + 7 days	0.56	47.9	60.0	3.9	99.3	27.5	15.8	39.1	9.1
	0.75	47.8	60.4	3.6	84.5	24.6	15.4	40.6	6.8
1 day preharvest	0.56	48.3	60.2	3.8	99.3	27.1	15.6	39.3	9.9
	0.75	46.2	60.2	3.8	98.3	25.1	15.3	39.2	8.6
LSD (p=0.05)		6.7	1.7	0.4	NS	6.0	1.3	4.6	NS

97JPY025. Rattail fescue control in winter wheat.

A trial to determine herbicide control of rattail fescue was established in a grower's field near Walla Walla, WA in October of 1997. The field has a history of continuous winter wheat with fall burning to manage crop residue prior to no-tillage planting. The experimental design was a randomized complete block with four replications and an individual plot size of 10 by 35 feet of which only the center 6 feet received the herbicide treatment. The soil type was a Palouse silt loam with pH of 4.8 containing 3.5% organic matter, 31% sand, 60% silt, and 10% clay. An imidazalinone resistant selection of "Fidel" winter wheat was seeded on October 14, 1997 at 84 lbs/a at 3 inch seeding depth in seven inch rows with a double disk drill. Herbicides were applied either fall, early spring, or late spring postemergence with a CO<sub>2</sub> backpack sprayer calibrated to deliver 10 gpa at 33 psi. Crop injury was visually rated on April 28 and rattail fescue control evaluated on April 28 and August 15. Wheat was harvested on August 25.

April 28 ratings indicated that no treatments injured winter wheat (data not shown). Fall applied sulfosulfuron provided greatest control of rattail fescue on both rating dates and had the greatest wheat yield. Only fall applied imazamox controlled rattail fescue greater than 50% at both rating dates. Fall application provided better rattail fescue control than early spring applications for sulfosulfuron and imazamox. No late spring treatments were effective. Early spring imazamox had the lowest yielding wheat because the spring application provided better control of non-imidazalinone resistant volunteer wheat which emerged between late fall and early spring, thus lessening the total wheat stand in this treatment. Volunteer wheat contributed greatly to grain yield in other treatments.

97JPY025. Rattail fescue control in winter wheat.

Location: Walla Walla  
Cooperator: Howard Smith

Crop Information

Planting Date: 10/14/97  
Row Spacing: 7 in.  
Seeding Rate: 84 lbs/A  
Variety: Fidel winter wheat

Application Information

	<u>Late Fall POST</u>	<u>Early Spring POST</u>	<u>Late Spring POST</u>
Treatment Date	11/11/97	3/18/98	4/10/98
Air Temperature	43 F	44 F	59 F
Relative Humidity	91%	62%	54%
Wind Velocity	1 mph South	9 mph West	12 mph SW
Soil Temperature	43 F	43 F	54 F
Soil Moisture	Wet	Dry	Wet
Cloud Cover	100%	95%	60%
Crop Stage	N/A	N/A	4-5 tiller
Height	N/A	N/A	N/A
Gal/Acre	10	10	10
Pressure	34	32	36
Nozzles	XR8001	XR8001	XR8001

97JPY025. Rattail fescue control in winter wheat.

Treatment	Rate	Application timing	Rattail fescue control		Wheat yield
			April 28	August 15	
	lbs. a.i./A		-----%-----		bu/a
Weedy check			0	0	40.1
Sulfosulfuron	0.031	Fall post	91	94	45.3
Imazamox <sup>a</sup>	0.031	Fall post	76	70	43.6
Metribuzin	0.25	Fall post	23	62	44.4
Sulfosulfuron	0.031	Early spring post	39	51	37.5
Imazamox <sup>a</sup>	0.031	Early spring post	38	45	35.7
Diclofop	1	Late spring post	9	12	39.6
Fenoxaprop /safener	0.1	Late spring post	11	18	41.7
Tralkoxydim <sup>b</sup>	0.18	Late spring post	1	0	44.4
Difenzoquat	1	Late spring post	8	0	42.4
Imazamethabenz <sup>a</sup>	0.41	Late spring post	1	0	42.7
LSD (P=0.05 for rattail fescue control; P=0.10 for wheat yield)			19	20	5.2

<sup>a</sup> Applied with nonionic surfactant at 0.25% v/v.

<sup>b</sup> Applied with TF8035 surfactant at 0.5% v/v.

97JPY027. Effect of spray solution pH on efficacy of sulfosulfuron.

This study was conducted to determine if spray solution pH had any effect on efficacy of sulfosulfuron control of downy brome. Sulfosulfuron rates of 0.023 and 0.031 lbs a.i./A were applied either spring or fall in spray solution pH of 4, 7, and 10. Distilled water was used as the spray carrier and pH was adjusted using buffers.

Generally, downy brome control increased as pH increased. Control was more effective with higher vs. lower rate and with fall vs. spring applications. Wheat in the plot area had a great amount of lodging, unrelated to treatment, which caused yields to be not significantly different.

97JPY027. Effect of spray solution pH on efficacy of sulfosulfuron.

Location: LaCross  
Cooperator: Bud Aune

Crop Information

Planting Date: 9/15/97  
Row Spacing: 12 in  
Seeding Rate: 36 lbs/A  
Variety: Fidel

Application Information

	<u>Fall POST</u>	<u>Spring POST</u>
Treatment Date	11/14/97	2/17/98
Air Temperature	39 F	50 F
Relative Humidity	82%	70%
Wind Velocity	0 mph	1 mph West
Soil Temperature	40 F	423 F
Soil Moisture	Wet	Dry
Cloud Cover	100%	95%
Crop Stage	N/A	6-7 tiller
Height	N/A	N/A
Gal/Acre	10	10
Pressure	34	35
Nozzles	XR8001	XR8001

97JPY027. Effect of spray solution pH on efficacy of sulfosulfuron.

Treatment	Rate	pH	Downy brome control		Wheat	
			5/13/98	7/19/98	yield	test weight
	lbs. a.i./A		----- % -----		bu/a	lbs/bu
Nontreated			0	0	72.5	58.9
<u>Fall applied</u>						
Sulfosulfuron*	0.023	4	71	84	85.5	58.9
Sulfosulfuron	0.031		73	83	85.5	59.0
Sulfosulfuron	0.023	7	75	91	83.7	58.3
Sulfosulfuron	0.031		78	81	85.1	58.7
Sulfosulfuron	0.023	10	82	89	86.5	59.6
Sulfosulfuron	0.031		87	91	84.3	58.8
<u>Spring applied</u>						
Sulfosulfuron	0.023	4	66	75	82	59.0
Sulfosulfuron	0.031		59	65	77.7	58.7
Sulfosulfuron	0.023	7	78	84	83.4	58.7
Sulfosulfuron	0.031		85	71	86.9	58.1
Sulfosulfuron	0.023	10	79	82	86	57.7
Sulfosulfuron	0.031		75	80	85.4	59.0
LSD (p=0.05)			11	10	NS	NS

\* All treatments applied with 0.5% nonionic surfactant.

97JPY028. Ventenata control with imazamox in imidazolinone resistant winter wheat.

A trial was established near Spangle, WA in the fall of 1997 to evaluate the control of ventenata with imazamox. The experimental design was a randomized complete block with four replications and an individual plot size of 7 by 35 feet. An imidazolinone resistant selection of "Fidel" winter wheat was seeded on October 15, 1997 at 84 lbs/a at 2 inch seeding depth in seven inch rows with a double disk drill. Herbicides were applied fall or spring postemergence with a CO<sub>2</sub> backpack sprayer calibrated to deliver 10 gpa at 33 psi. All herbicide applications included nonionic surfactant at 0.25% v/v. Crop injury was visually rated on April 29 and ventenata control evaluated on April 29 and June 17. Wheat was harvested on August 25.

No crop injury was observed to any treatment on April 29 (data not shown). Greatest control of ventenata was with fall-only or split fall plus spring applications. Greatest control within spring only-applications was with the highest imazamox application rate. Greatest wheat yield was with 0.032 lbs. a.i./A applied in the fall. Grain yield from fall and split applications of imazamox was not significantly different than the highest yielding treatment. Of the spring-only applications, only the highest rate applied in the spring did not yield significantly less than the highest yielding treatment. Neither the split nor any spring-only application yielded significantly greater than the weedy check.

97JPY028. Ventenata control with imazamox in imidazolinone resistant winter wheat.

Location: Liberty High School, Spangle

Cooperator: Curt Greenwalt

Crop Information

Planting Date: 10/15/97

Row Spacing: 7 in

Seeding Rate: 84 lbs/A

Variety: Fidel

Application Information

	<u>Fall POST</u>	<u>Spring POST</u>
Treatment Date	11/21/97	4/03/98
Air Temperature	37 F	58 F
Relative Humidity	95%	63%
Wind Velocity	3 mph	1 mph NWest
Soil Temperature	41 F	55 F
Soil Moisture	Wet	N/A
Cloud Cover	35%	65%
Crop Stage	1 to 2 leaf	N/A
Height	2.5 in	N/A
Gal/Acre	10	10
Pressure	34	32
Nozzles	XR8001	XR8001

97JPY028. Ventenata control with imazamox in imidazolinone resistant winter wheat.

Treatment	Rate	Application timing	Ventenata control		Wheat yield
			April 29	June 17	
	lbs. a.i./A		----- % -----		bu/A
Weedy check			0	0	18.7
Imazamox	0.024	Fall	67	83	27.6
Imazamox	0.032	Fall	86	90	30.1
Imazamox	0.04	Fall	82	95	26.3
Imazamox	0.048	Fall	89	99	29.2
Imazamox	0.024	Spring	66	79	18.5
Imazamox	0.032	Spring	62	80	19.6
Imazamox	0.04	Spring	79	89	19.4
Imazamox	0.048	Spring	80	94	24.6
Imazamox +	0.024 +	Fall	87	95	24.8
Imazamox	0.024	Spring			
LSD (P=0.05)			12	8	8

\* All treatments applied with 0.25% nonionic surfactant.

98JPY001-010 & 012. Weed control in pulse crops.

Studies were conducted in peas, lentils, and chickpeas in both conventional and no-tillage systems at Pullman and Walla Walla, WA for a total of 12 studies. Crop stands failed to establish in three of the four chickpea studies. The one successful chickpea study was at Walla Walla in conventional tillage. Specific crop and application information for each study is included in the report.

In no-tillage pea and lentil trials, spring preplant applications of imazethapyr always had a yield advantage over fall preplant applications, although the advantage was not significant in any of the trials. Weed control efficacy was not significantly different with fall or spring applied Imazethapyr. No-tillage, PRE applications of imazethapyr, sulfentrazone, BAY FOE 5043 + metribuzin, flumetsulam, and cloransulam methyl did not cause significant pea injury, but sulfentrazone and cloransulam methyl caused injury to lentils. Pea yield in all PRE treatments were greater than the weedy check, but lentil yield relative to the weedy check was reduced by the PRE application of cloransulam methyl at Pullman. Sulfentrazone injury to lentils at the Walla Walla location did not reduce seed yield relative to the weedy check. Each product showed good to excellent control of common lambsquarters, prickly lettuce (China lettuce), or mayweed chamomile (dog fennel) at one or more locations.

In PRE or PPI applications to conventionally tilled peas, imazethapyr, dimethenamide, sulfentrazone, flumetsulam, and cloransulam methyl each had greater seed yield than the weedy check at both Pullman and Walla Walla. Treatments of acetochlor yielded greater than the weedy check at Pullman and less than the weedy check at Walla Walla. Treatments of BAY FOE 5043 + metribuzin had the opposite response with yield being less than the weedy check at Pullman and greater than the weedy check at Walla Walla. The reason for this was a light weed infestation at Walla Walla where crop injury due to acetochlor reduced yields and a heavy infestation of common lambsquarters at Pullman where good weed control with acetochlor increased lentil yield and poor weed control with BAY FOE 5043 + metribuzin resulted in reduced yield.

In conventionally tilled lentils, treatments of PPI or PRE treatments of imazethapyr, dimethenamide, sulfentrazone, BAY FOE 5043 + metribuzin, and flumetsulam yields were not significantly different than the weedy check at both locations indicating crop safety. Reduced yields were seen at both locations with acetochlor and severe crop injury and yield reduction were observed with cloransulam methyl applied PRE at the Pullman location. Some lentil injury was noted with sulfentrazone, but yields were not significantly different than the weedy check either PPI or PRE at both locations.

In conventionally tilled chickpeas, PPI or PRE treatments of imazethapyr, acetochlor, dimethenamide sulfentrazone, BAY FOE 5043 + metribuzin, and flumetsulam yielded not significantly less than the weedy check. Weed pressure was light at this location and yield response was due more to crop safety than weed control. Cloransulam methyl applied PRE

reduced chickpea yield due to crop injury.

POST applications to peas resulted in inconsistent crop injury ratings for several products, but consistent injury was seen with cloransulam methyl and imazamox. Some safening was seen by tankmixing bentazon with imazamox. The most consistent and effective POST treatment across tillage system and location was bentazon and combinations which included bentazon.

All POST applications evaluated in lentils reduced yields relative to the weedy check. Fomesafen showed some potential for weed control and crop safety, but will require further research on timing and rate of application. Bentazon and cloransulam methyl both resulted in crop injury exceeding 35% at all locations and yield reduction averaging greater than 50% relative to the weedy check when averaged across location.

POST treatments of cloransulam methyl, flumichlorac, isoxaflutole, and fomesafen each had chickpea injury ratings in excess of 25%. However, chickpea seed yields with fomesafen at 0.25 and 0.375 lbs. a.i./A had yields similar to the weedy check in the one chickpea study, which had light weed pressure.

PPI and PRE applications of sulfentrazone, BAY FOE 5043 + metribuzin, dimethenamide, acetochlor, flumetsulam, and cloransulam methyl are worth further evaluation for use on peas. Dimethenamide, sulfentrazone, BAY FOE 5043 + metribuzin, and flumetsulam are worth further evaluation for PPI or PRE applications in lentils. Dimethenamide, sulfentrazone, BAY FOE 5043 + metribuzin, and flumetsulam will be further evaluated for use in chickpeas.

POST options are more limited with potential injury a concern with all products in all crops. Results will be further reviewed to determine best treatments to continue studying.

98JPY001. Weed control, crop injury, and yield in no-tillage peas at Pullman, WA.

Location: Pullman

Cooperator: WSU

Crop Information

Planting Date: 4/30/98

Row Spacing: 7 in

Seeding Rate: 176 lbs/A

Variety: Columbia peas

Application Information

	<u>Fall Preplant</u>	<u>Spring Preplant</u>	<u>PREE</u>	<u>POST</u>
Treatment Date	12/1/97	4/17/98	4/30/98	6/6/98
Air Temperature	39 F	50 F	86 F	73 F
Relative Humidity	92%	82%	39%	66 F
Wind Velocity	1 mph West	3 mph West	1 mph West	1 mph West
Soil Temperature	38 F	45 F	67 F	54 F
Soil Moisture	Wet	Wet	Wet	Dry
Cloud Cover	100%	50%	20%	70%
Crop Stage	N/A	N/A	N/A	N/A
Height	N/A	N/A	N/A	12 inches
Gal/Acre	10	10	10	10
Pressure	34	31	36	31
Nozzles	XR8001	XR8001	XR8001	XR8001

98JPY001. Weed control, crop injury, and yield in no-tillage peas at Pullman, WA.

Treatment	Rate	Timing	Prickly lettuce		Peas	
			Control		Injury	
			8/8	6/21	8/8	6/21
	lbs. a.i./A		-----%-----		lbs/A	
Weedy check			0	0		397.6
imazethapyr	0.047	Fall preplant	45	1		486.4
imazethapyr	0.047	Spring preplant	58	0		499.4
sulfentrazone	0.375	PRE	85	1		442.5
BAY FOE 5043 + metribuzin	0.5	PRE	35	1		447.9
flumetsulam	0.055	PRE	27	0		319.5
cloransulam methyl	0.032	PRE	39	1		427.5
imazamox + Sol 32*	0.031 + 1 qt	POST	62	19		313.2
imazamox*	0.03	POST	68	1		323.9
cloransulam methyl*	0.016	POST	0	73		146.6
flumiclorac*	0.027	POST	78	5		425.2
imazamox + bentazon**	0.03 + 0.5	POST	92	6		357.3
fomesafen	0.25	POST	91	20		340.8
bentazon + quizalofop**	0.5 + 0.053	POST	77	6		416
bentazon**	0.5	POST	77	3		369.4
cloransulam methyl*	0.032	POST	45	82		82
LSD (P=0.05)			29	7		163.6

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY002. Weed control, crop injury, and yield in no-tillage peas at Walla Walla, WA.

Location: Walla Walla  
Cooperator: Jay Dewitt

Crop Information

Planting Date: 4/01/98  
Row Spacing: 7.5 in  
Seeding Rate: 180 lbs/A  
Variety: Columbia peas

Application Information

	<u>Fall Preplant</u>	<u>Spring Preplant</u>	<u>PREE</u>	<u>POST</u>
Treatment Date	12/3/97	3/11/98	4/01/98	5/19/98
Air Temperature	30 F	58 F	49 F	62 F
Relative Humidity	92%	75%	66%	75%
Wind Velocity	0 mph	5 mph SWest	3 mph West	0 mph
Soil Temperature	33 F	43 F	48 F	51 F
Soil Moisture	Dry	Wet	Wet	Wet
Cloud Cover	100%	50%	80%	50%
Crop Stage	N/A	N/A	N/A	N/A
Height	N/A	N/A	N/A	10 inches
Gal/Acre	10	10	10	10
Pressure	34	34	36	33
Nozzles	XR8001	XR8001	XR8001	XR8001

98JPY002. Weed control, crop injury, and yield in no-tillage peas at Walla Walla, WA.

Treatment	Rate	Timing	Common lambsquarters		Peas		Yield
			Control		Injury		
			6/12	7/20	5/31	6/12	
	lbs. a.i./A		----- % -----			lbs/A	
Weedy check			0	0	0	0	247.3
imazethapyr	0.047	Fall preplant	91	90	0	0	302.5
imazethapyr	0.047	Spring preplant	93	88	0	0	328.3
sulfentrazone	0.375	PRE	92	92	2	3	272.5
BAY FOE 5043 + metribuzin	0.5	PRE	82	77	0	0	264.7
flumetsulam	0.055	PRE	67	82	0	1	268.4
cloransulam methyl	0.032	PRE	86	73	0	0	297.5
imazamox + Sol 32*	0.03 + 1 qt.	POST	90	92	3	4	206.7
imazamox*	0.03	POST	88	85	0	2	240.9
cloransulam methyl*	0.016	POST	72	57	28	80	81.6
flumiclorac*	0.027	POST	88	81	3	6	240.5
imazamox bentazon**	0.03 + 0.5	POST	88	80	3	0	326.2
fomesafen	0.25	POST	83	73	39	43	201.7
bentazon quizalofop**	0.5 + 0.053	POST	84	79	6	4	284.6
bentazon**	0.25	POST	51	68	0	2	319.5
cloransulam methyl*	0.5	POST	78	0	30	83	57.4
LSD (P=.05)			18	18	6	13	101.3

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY003. Weed control, crop injury, and yield in no-tillage lentils at Pullman, WA.

Location: Pullman

Cooperator: WSU

Crop Information

Planting Date: 4/30/98

Row Spacing: 7.5 in

Seeding Rate: 237 lbs/A

Variety: Brewer lentils

Application Information

	<u>Fall Preplant</u>	<u>Spring Preplant</u>	<u>PREE</u>	<u>POST</u>
Treatment Date	12/1/97	4/17/98	4/30/98	6/6/98
Air Temperature	39 F	50 F	82 F	76 F
Relative Humidity	92%	82%	40%	56%
Wind Velocity	1 mph West	3 mph West	3 mph West	2 mph West
Soil Temperature	38 F	45 F	62 F	66 F
Soil Moisture	Wet	Wet	Dry	Dry
Cloud Cover	20%	50%	20%	56%
Crop Stage	N/A	N/A	N/A	N/A
Height	N/A	N/A	N/A	5 inches
Gal/Acre	10	10	10	10
Pressure	34	31	36	34
Nozzles	XR8001	XR8001	XR8001	XR8001

98JPY003. Weed control, crop injury, and yield in no-tillage lentils at Pullman, WA.

Treatment	Rate	Timing	Prickly	Wild	Lentil	
			lettuce	oat		
			Control		Injury	
	lbs. a.i./A		8/13	8/13	6/21	Yield
			-----%-----			lbs/A
Weedy Check			0	0	0	465.8
imazethapyr	0.047	Fall preplant	90	80	0	589.3
imazethapyr	0.047	Spring preplant	84	81	1	631.7
sulfentrazone	0.375	PRE	81	72	1	578.5
BAY FOE 5043 + metribuzin	0.5	PRE	73	80	0	631.8
flumetsulam	0.055	PRE	80	63	0	591.6
cloransulam methyl	0.032	PRE	85	26	40	156.9
cloransulam methyl*+ Sol 32	0.016 + 1 qt.	POST	75	4	84	103.8
cloransulam methyl*	0.016	POST	85	0	84	108.1
cloransulam methyl + quizalofop*	0.016 + 0.053	POST	90	97	89	55.5
cloransulam methyl*	0.032	POST	89	0	88	43.8
fomesafen	0.25	POST	86	5	53	190.1
fomesafen	0.375	POST	86	9	87	120.9
fomesafen + quizalofop	0.25 + 0.053	POST	91	94	82	228.2
bentazon**	0.5	POST	88	6	91	225.9
bentazon + quizalofop*	0.5 + 0.053	POST	87	96	94	129.1
LSD (P=.05)			15	12	6	185.67

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY004. Weed control, crop injury, and yield in no-tillage lentils at Walla Walla, WA.

Location: Walla Walla  
Cooperator: Jay Dewitt

Crop Information

Planting Date: 4/01/98  
Row Spacing: 7.5 in  
Seeding Rate: 80 lbs/A  
Variety: Brewer lentils

Application Information

	<u>Fall Preplant</u>	<u>Spring Preplant</u>	<u>PREE</u>	<u>POST</u>
Treatment Date	12/3/97	3/11/98	4/01/98	5/19/98
Air Temperature	30 F	58 F	46 F	62 F
Relative Humidity	92%	75%	73%	75%
Wind Velocity	0 mph	5 mph SWest	3 mph West	0 mph
Soil Temperature	33 F	43 F	48 F	51 F
Soil Moisture	Dry	Wet	Dry	Wet
Cloud Cover	100%	50%	83%	50%
Crop Stage	N/A	N/A	N/A	N/A
Height	N/A	N/A	N/A	5 inches
Gal/Acre	10	10	10	10
Pressure	34	34	32	33
Nozzles	XR8001	XR8001	XR8001	XR8001

98JPY004. Weed control, crop injury, and yield in no-tillage lentils at Walla Walla, WA.

Treatment	Rate	Timing	Common	Field	Lentil		Yield
			Lambsquarters	Pennycress	Injury		
			Control	Control	5/31	6/12	
	lbs. a.i./A		6/12	6/12	----- % -----		lbs/A
Weedy Check			0	0	0	0	140.4
imazethapyr	0.047	Fall preplant	99	97	2	0	193.5
imazethapyr	0.047	Spring preplant	88	99	6	0	248.3
sulfentrazone	0.375	PRE	93	82	49	15	210.3
BAY FOE 5043 + metribuzin	0.5	PRE	45	78	2	0	213
flumetsulam	0.055	PRE	74	97	3	2	254.7
cloransulam methyl	0.032	PRE	80	98	20	2	328.9
cloransulam methyl* + Sol 32	0.016 + 1 qt.	POST	28	99	18	65	75.4
cloransulam methyl*	0.016	POST	26	99	20	62	52.2
cloransulam methyl +quizalofop*	0.016 + 0.053	POST	15	95	27	69	46.5
cloransulam methyl*	0.032	POST	14	98	49	86	19.2
fomesafen	0.25	POST	77	97	35	10	166.1
fomesafen	0.375	POST	88	98	43	20	100
fomesafen + quizalofop	0.25 + 0.053	POST	80	98	45	18	138.6
bentazon**	0.5	POST	46	97	31	37	83.8
bentazon + quizalofop*	0.5 + 0.053	POST	65	71	45	70	72.9
LSD (P=.05)			22	14	14	13	85.7

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY007. Weed control, crop injury, and yield in conventionally tilled peas at Pullman, WA.

Location: Pullman

Cooperator: WSU

Crop Information

Planting Date: 4/27/98

Row Spacing: 7 in

Seeding Rate: 203 lbs/A

Variety: Columbia peas

Application Information

	<u>PPI</u>	<u>PRE</u>	<u>POST</u>
Treatment Date	4/27/98	4/28/98	6/2/98
Air Temperature	66 F	83 F	68 F
Relative Humidity	63%	45%	70%
Wind Velocity	5 mph West	3 mph North	3 mph West
Soil Temperature	60 F	62 F	60 F
Soil Moisture	Dry	Dry	Dry
Cloud Cover	20%	20%	20%
Crop Stage	N/A	N/A	N/A
Height	N/A	N/A	10 inches
Gal/Acre	10	10	10
Pressure	32	32	34
Nozzles	XR8001	XR8001	XR8001

98JPY007. Weed control, crop injury, and yield in conventionally tilled peas at Pullman, WA.

Treatment	Rate	Timing	Mayweed	Common	Peas	
			chamomile	lambsquarters		
			Control	Control	Injury	Yield
	lbs a.i./A		6/18	6/18	6/18	lbs/A
Weedy Check			0	0	0	303.8
imazethapyr	0.047	PPI	39.8	97.5	0	335.6
acetachlor	2	PPI	83.5	82.5	2	379.6
dimethenamide	1	PPI	77.3	76.5	0	371.3
sulfentrazone	0.375	PPI	84.8	86.3	1.3	495.7
BAY FOE 5043 + metribuzin	0.5	PPI	83.2	88.7	0.2	395
flumetsulam	0.055	PPI	87.2	88.5	3.6	618.6
sulfentrazone	0.375	PRE	90.3	76.8	2.8	385.9
BAY FOE 5043 + metribuzin	0.5	PRE	86.5	88	2.5	298.2
flumetsulam	0.055	PRE	83.3	72.5	1.3	432.7
cloransulam methyl	0.032	PRE	91.3	83.3	0	404.3
cloransulam methyl*	0.016	POST	91.3	52.8	77.5	160
flumichlorac*	0.027	POST	71.5	90.3	40.7	91.9
imazamox*	0.03	POST	82.8	90	8	287.6
fomesafen	0.25	POST	92.8	88	7.5	319.2
bentazon**	0.5	POST	94.2	90.3	3.8	376.5
LSD (P=.05)			16.37	21.08	6.26	164.04

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY008. Weed control, crop injury, and yield in conventionally tilled peas at Walla Walla, WA.

Location: Walla Walla  
Cooperator: Greg Ferrell

Crop Information

Planting Date: 4/06/98  
Row Spacing: 7 in  
Seeding Rate: 200 lbs/A  
Variety: Phantom peas

Application Information

	<u>PPI</u>	<u>PRE</u>	<u>POST</u>
Treatment Date	4/06/98	4/06/98	6/2/98
Air Temperature	64 F	50 F	73 F
Relative Humidity	40%	60%	56%
Wind Velocity	5 mph South	1 mph South	4 mph East
Soil Temperature	54 F	57 F	74 F
Soil Moisture	Dry	Dry	Dry
Cloud Cover	32%	32%	90%
Crop Stage	N/A	N/A	N/A
Height	N/A	N/A	18 inches
Gal/Acre	10	10	10
Pressure	32	32	31
Nozzles	XR8001	XR8001	XR8001

98JPY008. Weed control, crop injury, and yield in conventionally tilled peas at Walla Walla, WA.

Treatment	Rate	Timing	Mayweed	Common	Peas	
			chamomile	lambsquarters	Injury	Yield
			Control	Control		
			7/20	6/12	6/23	
	lbs a.i./A		-----%-----			lbs/A
Weedy Check			0	0	0	2161.5
imazethapyr	0.047	PPI	19	1	0	2465.4
acetachlor	2	PPI	16	15	13	2008.4
dimethenamide	1	PPI	54	5	5	2293.3
sulfentrazone	0.375	PPI	72	0	1	2527.8
BAY FOE 5043 + metribuzin	0.5	PPI	50	0	0	2474.1
flumetsulam	0.055	PPI	55	4	3	2601.9
sulfentrazone	0.375	PRE	93	0	0	2388.3
BAY FOE 5043 + metribuzin	0.5	PRE	70	0	0	2432.6
flumetsulam	0.055	PRE	86	0	0	2488.9
cloransulam methyl	0.032	PRE	79	4	4	2210.9
cloransulam methyl*	0.016	POST	0	32	61	143.1
flumichlorac*	0.027	POST	0	1	2	2335.1
imazamox*	0.03	POST	29	20	24	1610.3
fomesafen	0.25	POST	53	8	7	2265.3
bentazon**	0.5	POST	84	0	5	2443.2
LSD (P=.05)			19	5	6	279.8

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY009. Weed control, crop injury, and yield in conventionally tilled lentils at Pullman, WA.

Location: Pullman

Cooperator: WSU

Crop Information

Planting Date: 4/28/98

Row Spacing: 7 in

Seeding Rate: 62 lbs/A

Variety: Brewer lentils

Application Information

	<u>PPI</u>	<u>PRE</u>	<u>POST</u>
Treatment Date	4/27/98	4/28/98	6/2/98
Air Temperature	80 F	80 F	68 F
Relative Humidity	48%	45%	68%
Wind Velocity	3 mph West	1 mph North	4 mph West
Soil Temperature	59 F	64 F	61 F
Soil Moisture	Dry	Dry	Dry
Cloud Cover	20%	20%	20%
Crop Stage	N/A	N/A	N/A
Height	N/A	N/A	5 inches
Gal/Acre	10	10	10
Pressure	32	33	34
Nozzles	XR8001	XR8001	XR8001

98JPY009. Weed control, crop injury, and yield in conventionally tilled lentils at Pullman, WA.

Treatment	Rate	Timing	Common lambsquarters		Lentil		yield
			control		injury		
			6/18	7/8	6/18	7/8	
	lbs. a.i/A		-----%-----				lbs/A
Weedy Check			0	0	0	0	707
imazethapyr	0.047	PPI	92	85	0	0	696.5
acetachlor	2	PPI	83	71	24	14	486.6
dimethenamide	1	PPI	68	80	0	0	716.4
sulfentrazone	0.375	PPI	92	84	1	7	801.1
BAY FOE 5043 + metribuzin	0.5	PPI	53	59	0	0	726.9
flumetsulam	0.055	PPI	68	63	0	0	607.9
sulfentrazone	0.375	PRE	94	95	1	14	694.3
BAY FOE 5043 + metribuzin	0.5	PRE	45	48	0	0	635.2
flumetsulam	0.055	PRE	64	58	1	0	780.3
cloransulam methyl	0.032	PRE	41	50	67	65	248.5
cloransulam methyl*	0.016	POST	32	14	84	87	82.9
cloransulam methyl*	0.032	POST	33	0	90	97	85.1
fomesafen	0.25	POST	69	33	44	5	436.8
fomesafen	0.375	POST	47	2	56	6	377
bentazon**	0.5	POST	82	61	97	93	78.5
LSD (P=.05)			29	23	11	5	196.3

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY010. Weed control, crop injury, and yield in conventionally tilled lentils at Walla Walla, WA.

Location: Walla Walla  
Cooperator: Greg Ferrel

Crop Information

Planting Date: 4/06/98  
Row Spacing: 7in  
Seeding Rate: 177 lbs/A  
Variety: Brewer lentils

Application Information

	<u>PPI</u>	<u>PRE</u>	<u>POST</u>
Treatment Date	4/06/98	4/06/98	6/2/98
Air Temperature	64 F	45 F	73 F
Relative Humidity	40%	70%	56%
Wind Velocity	5 mph South	1 mph South	4 mph East
Soil Temperature	54 F	55 F	74 F
Soil Moisture	Dry	Dry	Dry
Cloud Cover	32%	30%	90%
Crop Stage	N/A	N/A	N/A
Height	N/A	N/A	7 inches
Gal/Acre	10	10	10
Pressure	31	32	31
Nozzles	XR8001	XR8001	XR8001

98JPY010. Weed control, crop injury, and yield in conventionally tilled lentils at Walla Walla, WA.

Treatment	Rate	Timing	Mayweed chamomile	Lentil		yield
			control	injury		
			8/3	6/12	6/23	
	lbs a.i./A		-----	% -----		lbs/A
Weedy Check			0	0	0	1036.6
imazethapyr	0.047	PPI	42.5	0.5	1.3	1082.4
acetachlor	2	PPI	63.8	18.8	19.8	674.5
dimethenamide	1	PPI	0	0	0	950.3
sulfentrazone	0.375	PPI	68.8	4	0	926.4
BAY FOE 5043 + metribuzin	0.5	PPI	43.5	0	0.8	980
flumetsulam	0.055	PPI	75	0.5	1.3	923.4
sulfentrazone	0.375	PRE	82.5	11	2.3	856.4
BAY FOE 5043 + metribuzin	0.5	PRE	60	0	0	935.4
flumetsulam	0.055	PRE	84.3	0	3.8	830
cloransulam methyl	0.032	PRE	90.8	6	6.5	883.4
cloransulam methyl*	0.016	POST	22.5	46	79	70.1
cloransulam methyl*	0.032	POST	52	47.8	78.3	54.4
fomesafen	0.25	POST	45	22.5	15.8	772.3
fomesafen	0.375	POST	20	34	26.5	579.5
bentazon**	0.5	POST	12.5	51.8	85.5	67.3
LSD (P=.05)			27.89	7.62	6.7	240.41

\* Applied with 0.25% nonionic surfactant.

\*\* Applied with 1 qt/A crop oil concentrate

98JPY012. Weed control, crop injury, and yield in conventionally tilled chickpeas at Walla Walla, WA.

Location: Walla Walla  
Cooperator: Greg Ferrel

Crop Information

Planting Date: 4/06/98  
Row Spacing: 7in  
Seeding Rate: 203 lbs/A  
Variety: Dwelly chickpeas

Application Information

	<u>PPI</u>	<u>PRE</u>	<u>POST</u>
Treatment Date	4/06/98	4/06/98	6/2/98
Air Temperature	64 F	60 F	73 F
Relative Humidity	40%	40%	56%
Wind Velocity	5 mph South	1 mph South	4 mph East
Soil Temperature	54 F	58 F	74 F
Soil Moisture	Dry	Dry	Dry
Cloud Cover	32%	35%	90%
Crop Stage	N/A	N/A	N/A
Height	N/A	N/A	7 inches
Gal/Acre	10	10	10
Pressure	32	32	31
Nozzles	XR8001	XR8001	XR8001

98JPY012. Weed control, crop injury, and yield in conventionally tilled chickpeas at Walla Walla, WA.

Treatment	Rate	Timing	Mayweed chamomile			Chickpea		
			control			Injury		Yield
			6/12	6/23	8/3	6/12	6/23	
	lbs a.i./A		-----%-----					lbs/A
Weedy Check			0	0	0	0	0	686.2
imazethapyr	0.047	PPI	40.8	35.8	42.5	0	0	685.2
acetachlor	2	PPI	85.8	76	82	1.8	0	548.4
dimethenamide	1	PPI	41.5	52.8	26.3	1.8	1.8	644.5
sulfentrazone	0.375	PPI	87.5	77.3	83.3	0.8	0	646.8
BAY FOE 5043 + metribuzin	0.5	PPI	66.5	45	48.8	0	1.3	692
flumetsulam	0.055	PPI	45	44.3	48.3	0	1.3	705.6
sulfentrazone	0.375	PRE	93	83.8	88.8	0	0	601.5
BAY FOE 5043 + metribuzin	0.5	PRE	94	92.8	86.5	0	0	483.3
flumetsulam	0.055	PRE	87	84.5	88.3	0	0	501.5
cloransulam methyl	0.032	PRE	93.8	93.8	91.8	2	5	327.5
cloransulam methyl*	0.016	POST	49	47.5	54.8	16.3	26.5	563.8
cloransulam methyl*	0.032	POST	60.8	50	54.3	20.5	37.3	293.6
flumiclorac*	0.04	POST	25.8	18.8	21.3	25.8	27	638.3
isoxaflutole*	0.5	POST	48.8	51	65	16.5	34.8	519.5
isoxaflutole*	0.375	POST	52.4	50.9	56	18.1	36.6	416.6
fomesafen	0.25	POST	42.5	43.8	17.5	20.3	25.8	688.4
fomesafen	0.375	POST	43.5	32.3	28.8	23.8	31.8	647.9
pyridate	0.94	POST	60.5	55	65	3.3	1.3	551.9
LSD (P=.05)			29.18	33.09	32.37	6.43	6.56	205.47

\* Applied with 0.25% nonionic surfactant.

98JPY013. Weed control efficacy and phytotoxicity of Canvas.

This study was established to determine the efficacy and phytotoxicity of Canvas herbicide in winter wheat. Applications were made in the spring of 1998. All herbicide treatments provided excellent control of tumble mustard. All herbicide treatments had greater yield than the nontreated but results were not significantly different at  $p=0.05$ .

98JPY013. Weed control efficacy and phytotoxicity of Canvas

Location: Lind  
Cooperator: WSU

Crop Information

Planting Date: 9/03/97  
Row Spacing: 16 in  
Seeding Rate: 45 lbs/A  
Variety: Eltan wheat

Application Information

	<u>POST</u>
Treatment Date	3/17/98
Air Temperature	50 F
Relative Humidity	50%
Wind Velocity	12 mph NWest
Soil Temperature	48 F
Soil Moisture	Dry
Cloud Cover	50%
Crop Stage	N/A
Height	N/A
Gal/Acre	10
Pressure	32
Nozzles	XR8001

98JPY013. Weed control efficacy and phytotoxicity of Canvas

Treatment	Rate lbs a.i. /A	Tumble Mustard		Winter Wheat	
		Control		Injury	
		5/13	7/9	5/13	Yield
Weedy Check		0	0	0	42.3
Canvas	0.018	91	98	2	45.5
Canvas	0.0039	90	96	2	49.8
Canvas	0.0027	88	96	3	48.8
Canvas + 2,4-D Amine	0.018 + 0.5	99	99	2	49.4
Canvas + 2,4-D	0.0039 + 0.5	99	99	0	50.8
Canvas + 2,4-D	0.0027 + 0.5	99	99	1	47.1
Peak + 2,4-D	0.0089 + 0.5	99	98	1	48.7
Peak + 2,4-D	0.013 + 0.5	98	99	1	53.2
Peak + 2,4-D	0.018 + 0.5	99	99	1	47
Harmony + 2,4-D	0.023 + 0.5	99	99	1	46.8
Harmony Extra	0.023	98	99	2	44.7
LSD (P=.05)		3	2	NS	NS

98JPY015. Weed control in no-tillage safflower.

A field trial was conducted to determine safflower crop safety and weed control efficacy in a grower's field near Ritzville, WA. The experimental design was a randomized complete block with four replications and an individual plot size of 10 by 35 feet. Granular trifluralin was applied by hand to the full 10 foot width of the respective plots during the fall of 1997.

Herbicide granules were blended with sand to ensure even distribution. No tillage was performed to incorporate trifluralin. Other herbicides treatments were applied either spring preemergence or postemergence to the center 6 feet of respective plots with a CO<sub>2</sub> backpack sprayer calibrated to deliver 10 gpa at 33 psi. Safflower was directly seeded into small grain stubble in 7.5 inch rows on April 6, 1998. Crop injury and Russian thistle control was visually rated on June 27 and July 9, 1998. Safflower was harvested on September 3, 1998.

Slight crop injury was observed at both rating dates for sulfentrazone and fomesafen. More severe injury was seen with tribenuron. Control of Russian thistle was greatest with pendimethalin, sulfentrazone, thifensulfuron, and tribenuron. Safflower yields were greatest in trifluralin and quizalafop treatments. Grass weed infestation was light in the experiment. Therefore, yield was more related to crop injury than weed control. The lowest yielding treatments was tribenuron due to severe crop injury. Slight yield reduction relative to the weedy check was observed in the fomesafen treatment. The amount of injury observed in sulfentrazone plots did not appear to reduce safflower yields.

98JPY015. Weed control in no-tillage safflower.

Location: Ritzville

Cooperator: Ron Jirava

Crop Information

Planting Date: 4/06/98

Row Spacing: 7.5in

Application Information

	<u>Fall Preplant</u>	<u>PRE</u>	<u>POST</u>
Treatment Date	12/17/97	4/08/98	6/9/98
Air Temperature	N/A	56 F	78 F
Relative Humidity	N/A	100%	50%
Wind Velocity	5 mph South	3 mph East	5 mph SWest
Soil Temperature	N/A	55 F	80 F
Soil Moisture	Dry	Dry	Dry
Cloud Cover	N/A	90%	10%
Crop Stage	N/A	N/A	11 nodes
Height	N/A	N/A	10 inches
Gal/Acre	N/A	10	10
Pressure	N/A	34	31
Nozzles	Granular	XR8001	XR8001

98JPY015. Weed control in no-tillage safflower.

Treatment	Rate	Crop injury		Russian thistle control		Safflower yield
		June 27	July 9	June 27	July 9	
	lbs. a.i./A	----- % -----				lb/A
Weedy check		0	0	0	0	724
Trifluralin <sup>a</sup>	1	3	0	52	64	861
Pendimethalin	1	0	4	69	81	753
Sulfentrazone	0.25	4	11	75	77	752
Sulfentrazone	0.38	8	9	87	83	776
Imazamethabenz <sup>b</sup>	0.25	0	0	40	58	745
Thifensulfuron <sup>b</sup>	0.38	0	0	73	81	721
Tribenuron <sup>b</sup>	0.33	40	71	86	88	135
Fomesafen	0.25	11	15	48	61	663
Quizalafop <sup>b</sup>	0.4	2	0	0	0	828
LSD (P=0.05)		7	11	15	22	158

<sup>a</sup> 10% granular formulation.

<sup>b</sup> Applied with nonionic surfactant at 0.25% v/v.

98JPY016. Broadleaf control in wheat with Rave Herbicide.

This study was designed to determine efficacy and phytotoxicity of Rave herbicide in winter wheat. Tumble mustard control was excellent with all herbicide applications. Prickly lettuce control was more variable, but greater control was seen with Rave applications than with Finesse. Yields were not significantly different at  $p=0.05$ .

98JPY016. Broadleaf control in wheat with Rave Herbicide.

Location: Lind  
Cooperator: WSU

Crop Information

Planting Date: 9/03/97  
Row Spacing: 16 in  
Seeding Rate: 45 lbs/A  
Variety: Eltan wheat

Application Information

	<u>POST</u>
Treatment Date	4/08/98
Air Temperature	70 F
Relative Humidity	40%
Wind Velocity	1 mph South
Soil Temperature	53 F
Soil Moisture	Dry
Cloud Cover	50%
Crop Stage	N/A
Height	N/A
Gal/Acre	10
Pressure	32
Nozzles	XR8001

98JPY016. Broadleaf control in wheat with Rave Herbicide.

Treatment	Rate	Tumble Mustard			Prickly lettuce	Winter wheat		
		Control			4/27	Injury		Yield
		4/27	5/13	7/9		4/27	4/27	
	lbs a.i./A	----- % -----						bu/A
Weedy Check		0	0	0	0	0	0	46.9
Rave	0.055	79	86	93	80	1	0	52.5
Rave	0.073	79	86	97	81	1	1	51.1
Rave	0.092	76	86	97	82	1	0	51
Rave	0.11	79	86	96	80	1	0	46.8
Rave	0.128	81	89	98	84	2	0	53.1
Rave	0.147	81	87	99	86	2	0	47.5
Rave	0.165	79	88	99	81	2	0	45.6
Finesse	0.012	79	86	98	76	1	0	48.8
Finesse	0.019	78	87	99	77	2	2	50.8
LSD (P=.05)		4	3	3	7	NS	1	NS

98JPY017. Weed control and spring wheat injury with Canvas herbicide and effect on graminicide efficacy.

This experiment was established to determine if tankmixing Canvas or M6316 with a number of grass herbicides resulted in reduced activity of the Canvas or of the graminicides. Following the applications to this and an adjacent site, it was suspected that diclofop resistant wild oat was present in the field. It was strongly suspected that the resistant biotype also exhibited resistance to tralkoxydim.

None of the graminicides adversely affected the activity of the Canvas. Only the tralkoxydim showed decreased grass control activity when tankmixed with Canvas. Tralkoxydim was not adversely affected by tankmixing with M6316.

98JPY017. Weed control and spring wheat injury with Canvas herbicide and effect on graminicide efficacy.

Location: Endicott

Cooperator: Cleter Hughs

Crop Information

Planting Date: 4/20/98

Row Spacing: 7 in

Seeding Rate: 83 lbs/A

Variety: Penewawa wheat

Application Information

	POST	POST
Treatment Date	6/01/98	6/11/98
Air Temperature	60 F	81 F
Relative Humidity	68%	58%
Wind Velocity	1 mph SWest	5 mph West
Soil Temperature	72 F	55 F
Soil Moisture	Dry	N/A
Cloud Cover	50%	65%
Crop Stage	3 tiller	5 tiller
Height	N/A	N/A
Gal/Acre	15	15
Pressure	30	34
Nozzles	XR80015	XR80015

98JPY017. Weed control and spring wheat injury with Canvas herbicide and effect on graminicide efficacy.

Treatment	Rate lbs a.i./A	Timing	Wild Oat		Russian thistle		Spring Wheat	
			Control				Injury	
			6/26	7/14	6/26	7/14	6/26	Yield
Weedy Check			0	0	0	0	0	6.6
Canvas	0.018	POST	0	0	73	81	2	8.8
Canvas	0.018	POST	92	88	80	73	1	10.5
Avenge	0.75	POST						
Canvas	0.018	POST	92	86	57	30	0	10
Assert	0.375	POST						
Canvas	0.018	POST	84	66	82	80	1	11.6
Hoelon	0.75	POST						
Canvas	0.018	POST	92	82	87	76	2	11.7
Tiller	0.58	POST						
Canvas	0.018	POST	95	95	72	51	2	11.6
Puma	0.1	POST						
Canvas	0.018	POST	57	35	66	85	0	12.1
Achieve	0.18	POST						
M6316	0.024	POST	90	82	56	37	2	9.7
Avenge	0.75	POST						
M6316	0.024	POST	92	77	35	20	1	5.5
Assert	0.375	POST						
M6316	0.024	POST	67	71	38	34	0	8.1
Hoelon	0.75	POST						
M6316	0.024	POST	88	87	72	68	9	10.2
Tiller	0.58	POST						
M6316	0.024	POST	94	95	56	42	2	10
Puma	0.1							

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98JPY017. Weed control and spring wheat injury with Canvas herbicide and effect on graminicide efficacy.

(continued)

Treatment	Rate lbs a.i./A	Timing	Wild Oat		Russian thistle		Spring Wheat	
			Control				Injury	
			6/26	7/14	6/26	7/14	6/26	Yield
			-----		%	-----		bu/A
M6316	0.024	POST	73	75	35	51	0	10.2
Achieve	0.18	POST + 7 days						
Canvas	0.018	POST	90	86	73	61	3	11.5
Avenge	0.75	POST + 7 days						
Canvas	0.018	POST	91	94	66	56	6	8.6
Assert	0.375	POST + 7 days						
Canvas	0.018	POST	87	65	79	52	5	9.7
Hoelon	0.75	POST + 7 days						
Canvas	0.018	POST	95	93	84	84	15	8.4
Tiller	0.58	POST + 7 days						
Canvas	0.018	POST	95	94	68	69	2	9.4
Puma	0.1	POST + 7 days						
Canvas	0.018	POST	88	80	66	47	4	10.7
Achieve	0.18	POST + 7 days						
Avenge	0.75	POST	94	86	0	0	1	12.3
Assert	0.375	POST	95	87	37	0	4	12.9
Hoelon	0.75	POST	74	75	0	0	0	13.1
Tiller	0.58	POST	92	93	58	39	7	10.9
Puma	0.1	POST	95	95	0	0	2	10.1
Achieve	0.18	POST	66	79	0	0	0	3.8
Weedy Check			0	0	0	0	0	6.6
LSD (P=.05)			16	14	20	29	4	NS

98JPY018. Tankmixing broadleaf herbicides with Achieve grass herbicide.

This study was established to determine if tankmixing Achieve with a broadleaf herbicide reduces grass control activity by the Achieve.

Control of wild oat with Achieve at 0.18 lbs. a.i./A was increased by tankmixing with 1.5 lbs/A ammonium sulfate (AMS). Moreover, wild oat control was increased by the addition of AMS in all of the Achieve plus broadleaf herbicide tankmix combinations except where Achieve plus 2,4-D ester and Curtail at 0.5 and 0.3 lbs. a.i./A, respectively. Tankmixing 0.18 lbs Achieve with 0.0175 lbs Peak greatly reduced wild oat control even when applied with AMS. Increasing the Achieve rate to 0.25 lbs. a.i./A increased wild oat control.

98JPY018. Tankmixing broadleaf herbicides with Achieve grass herbicide.

Location: Pullman

Cooperator: Keith Kopf

Crop Information

Planting Date: 4/01/98

Row Spacing: 7.5 in

Seeding Rate: 110 lbs/A

Variety: Unknown

Application Information

	<u>POST</u>
Treatment Date	5/12/98
Air Temperature	63 F
Relative Humidity	74%
Wind Velocity	4 mph West
Soil Temperature	59 F
Soil Moisture	Moist
Cloud Cover	30%
Crop Stage	N/A
Height	N/A
Gal/Acre	10
Pressure	35
Nozzles	XR8001

98JPY018. Tankmixing broadleaf herbicides with Achieve grass herbicide.

Treatment	Rate	Wild oats		Spring wheat		Yield
		Control		Injury		
		6/21	8/12	5/21	6/21	
	lbs. a.i./A	----- % -----				bu/A
Weedy Check		0	0	0	0	32.5
Achieve*	0.18	83	74	1	0	36.4
Achieve**	0.18	99	94	0	0	35.7
Achieve	0.18 +	99	89	3	1	38.6
Bronate*	0.75					
Achieve + Bronate**	0.18 + 0.75	98	93	6	1	38
Achieve + Buctril*	0.18 + 1	98	72	4	1	33.8
Achieve + Buctril**	0.18 + 1	99	92	6	0	40
Achieve+ Starane + 2,4-D Ester*	0.18 + 0.125 + 0.5	99	83	2	2	36.9
Achieve + Starane + 2,4-D Ester**	0.18 + 0.125 + 0.5	99	92	9	2	42.3
Achieve + Starane + MCPA-Ester*	0.18 + 0.125 + 0.5	98	88	1	0	39.8

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98JPY018. Tankmixing broadleaf herbicides with Achieve grass herbicide.

(continued)

Treatment	Rate lbs. a.i./A	Wild oats		Spring wheat		Yield bu/A
		Control		Injury		
		6/21	8/12	5/21	6/21	
		----- % -----				
Achieve + Starane + MCPA-Ester**	0.18 + 0.125 + 0.5	99	93	3	1	37.6
Achieve + 2,4-D Ester*	0.18 + 0.5	95	78	3	0	40.4
Achieve + 2,4-D Ester**	0.18 + 0.5	98	71	4	0	40.5
Achieve + Curtail*	0.18 + 0.3	83	76	1	0	39.4
Achieve + Curtail**	0.18 + 0.3	83	66	3	0	39.5
Achieve + Peak**	0.18 + 0.0175	43	25	1	0	39.2
Achieve + Peak**	0.25 + 0.0175	90	85	1	0	45.1
Achieve + Harmony Extra**	0.18 + 0.023	96	88	3	1	39.1
Achieve + Harmony Extra**	0.25 + 0.023	98	93	2	0	37.5
Weedy Check		0	0	0	0	40.2
LSD (P=.05)		11	17	2	NS	NS

\* Applied with 0.5 % v/v Supercharge surfactant

\*\* Applied with 0.5 % v/v Supercharge surfactant and 1.5 lbs/A ammonium sulfate

98JPY019. Determination of rate for fertilizer enhancement of Achieve.

This experiment was established to determine how dry or liquid ammonium sulfate (AMS) formulation and the addition of solution 32 liquid fertilizer affected wild oat and Italian ryegrass control with Achieve. Achieve controlled grassy weeds greater than 85% with all herbicide combinations and rates except 0.125 lbs. a.i./A Achieve. Addition of liquid or dry AMS or solution 32 increased grass control with Achieve at all rates of application. Achieve at 0.18 lbs. a.i./A controlled both grasses and spring wheat yields were comparable to the top performing treatment.

98JPY019. Determination of rate for fertilizer enhancement of Achieve.

Location: Pullman

Cooperator: Mark Whitmore

Crop Information

Planting Date: 4/05/98

Row Spacing: 6 in

Seeding Rate: 110 lbs/A

Variety: Alpowa wheat

Application Information

	<u>POST</u>
Treatment Date	5/18/98
Air Temperature	86 F
Relative Humidity	46%
Wind Velocity	3 mph SWest
Soil Temperature	55 F
Soil Moisture	Wet
Cloud Cover	80%
Crop Stage	3 tiller/8 leaf
Height	N/A
Gal/Acre	10
Pressure	34
Nozzles	XR8001

98JPY019. Determination of rate for fertilizer enhancement of Achieve.

Treatment	Rate	Italian ryegrass		Wild oats	Spring wheat		Yield
		control		8/12	crop injury		
		6/14	8/12		5/28	6/14	
	lbs a.i./A	----- % -----					bu/A
Weedy Check		0	0	0	0	0	57.5
Achieve*	0.125	76	81	72	1	0	70.4
Achieve + Am. Sulfate*	0.125 + 1.5	89	84	94	0	1	73.4
Achieve*	0.18	92	87	91	0	2	75.1
Achieve + Am. Sulfate*	0.18 + 1.5	95	91	96	1	0	71.1
Achieve*	0.25	91	90	97	1	1	66.9
Achieve + Am. Sulfate*	0.25 + 1.5	98	93	98	1	0	76.8
Achieve + Liq. Am. Sulfate *	0.18 + 1.5 qts	92	89	95	1	0	70.5
Achieve + Sol 32*	0.18 + 1 qt	93	92	93	2	1	76.5
Hoelon**	1	94	94	98	4	4	73.6
Assert***	0.47	77	73	85	10	5	59.4
Assert + Avenge***	0.23 + 0.5	74	57	68	7	1	62.6
Tiller	0.58	82	53	94	4	0	67.7
Puma	0.05	88	79	91	3	0	69.8
Puma	0.1	90	83	97	4	0	77.3
Horizon**	0.066	94	91	97	2	1	79.4
Horizon**	0.079	91	94	99	2	0	75.6
Weedy Check		0	0	0	0	0	62.5
LSD (P=.05)		13	19	12	2	2	12.93

\* Applied with Supercharge surfactant at 0.5% v/v

\*\* Applied with crop oil concentrate at 1 pt/A

\*\*\* Applied with nonionic surfactant at 0.25% v/v

98JPY020. Touchdown preplant burndown in spring wheat.

This study was established to determine if Touchdown herbicide used as a preplant nonselect herbicide for control of weeds and volunteer grain had any detriment to a spring wheat crop. Visual observations at 2, 4, & 6 weeks following spring wheat planting indicated no injury to the crop with applied rates of Touchdown (data not shown). Additionally, all treatments provided excellent control of weeds and volunteer grain and were not significantly different (data not shown). A Hessian fly infestation occurred due to the late planting of the spring wheat and yields were greatly reduced. Yields in the experiment were not significantly different.

<u>Treatment</u>	<u>Rate</u>
	pt/A
Touchdown 5 EC	0.8*
Touchdown 5 EC	1.6*
Touchdown 5 EC	1.6
Touchdown 5 EC	2.4*
<u>Roundup Ultra</u>	<u>2</u>

\*Applied with nonionic surfactant at 0.25% v/v

98JPY020. Touchdown preplant burndown in spring wheat.

Location: Pullman

Cooperator: WSU

Crop Information

Planting Date: 5/20/98

Row Spacing: 7 in

Seeding Rate: 90 lbs/A

Variety: Penawawa

Application Information

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Treatment Date	6/16/98
Air Temperature	63 F
Relative Humidity	60%
Wind Velocity	5 mph SEast
Soil Temperature	51 F
Soil Moisture	Dry
Cloud Cover	41%
Crop Stage	tillered
Height	4 inches
Gal/Acre	10
Pressure	29
Nozzles	XR8001

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## 98JPY021. Grass weed control in timothy for hay.

Timothy hay is a valuable export commodity for the state of Washington. The export market demands that the timothy hay be of high quality and free of other plant species. Thus, hay growers must control grasses that are normally considered forage species in timothy fields to receive a premium price on the export market. The purpose of this research was to evaluate herbicides for control of volunteer oats and *Lolium* sp. and injury to timothy.

Herbicide treatments to compare grass weed control in timothy for hay were established in the spring of 1998 in Kittitas County, WA. Timothy had been planted in the field the previous fall following harvest of a tame oat crop. The experimental design was a randomized complete block with four replications. Individual plot size was 10 by 25 feet with only the center 6 feet of each plot receiving the herbicide treatment. Treatments were applied postemergence to crop and weeds on April 22, 1998 with a CO<sub>2</sub> backpack sprayer calibrated to deliver 10 gpa at 31 psi to 6 to 8 in. tall timothy with a developed corm, 0.5 to 3 in. tall 1-leaf to fully tillered mixture of perennial and Italian ryegrass (*Lolium* sp.), and 0.5 in. tall one to 3-leaf volunteer oats. Environmental conditions at application were as follows: air temperature 48 F, relative humidity 90%, wind less than 1 mph, cloud cover 30%, and soil temperature 51 F at 2 in. Rill irrigation was begun approximately 1 wk following herbicide application. Timothy injury was visually evaluated on May 1, May 17, and June 16. Volunteer oat and *Lolium* sp. control was visually evaluated on June 16. Hay was cut and harvested between June 20 and June 25. Hay yields and percentage composition were not evaluated. On July 10, following harvest regrowth of *Lolium* sp. was visually evaluated for control.

The tralkoxydim treatment was the only treatment with little to no timothy hay injury at all rating dates. Treatments of diclofop, sulfosulfuron, and imazamethabenz had timothy injury ratings of 4, 31, and 22%, respectively, on May 1 with injury increasing to 34, 64, and 29%, respectively, by May 17 before recovering to more acceptable levels by June 16. Tralkoxydim provided good to excellent control of both volunteer oats and *Lolium* sp. Volunteer oat and *Lolium* sp. control with diclofop were good to excellent. *Lolium* sp. control with sulfosulfuron varied between rating dates while volunteer oat control was excellent. Imazamethabenz gave excellent control of volunteer oats, but poor control of *Lolium* sp. All other herbicides provided excellent control of volunteer oats. Control of *Lolium* sp. was variable between rating dates within a herbicide treatment. In the treatments with the most extreme differences severe timothy injury allowed the lesser injured *Lolium* sp. an opportunity to recover in the absence of crop competition following hay harvest prior to the July 10 rating.

98JPY021. Grass weed control in timothy for hay.

Location: Ellensburg

Cooperator: Don Renehart

Crop Information

Variety: Timothy hay

Application Information

	<u>POST</u>
Treatment Date	4/22/98
Air Temperature	48 F
Relative Humidity	90%
Wind Velocity	0 mph
Soil Temperature	51 F
Soil Moisture	Dry
Cloud Cover	30%
Crop Stage	Vegetative
Height	4 inches
Gal/Acre	10
Pressure	31
Nozzles	XR8001

98JPY021. Grass weed control in timothy for hay.

Treatment	Rate	Timothy injury			Weed control		
		May 1	May 17	June 16	Volunteer oats	<i>Lolium sp.</i>	
					June 16	June 16	July 10
	lbs. a.i./A	----- % -----					
Clethodim <sup>a</sup>	0.1	41	99	99	99	99	93
Imazamethabenz <sup>b</sup>	0.47	22	29	9	99	30	11
Tralkoxydim <sup>c</sup>	0.18	1	0	1	91	95	86
Sethoxydim <sup>a</sup>	0.2	37	98	99	99	99	74
Fenoxaprop /safener	0.1	18	83	65	94	16	0
Fluazifop + fenoxaprop <sup>a</sup>	0.05 + 0.016	42	92	90	99	80	19
Diclofop	1	4	34	19	96	88	76
Sulfosulfuron	0.031	31	64	18	93	87	50
Imazamox <sup>b</sup>	0.031	34	90	83	96	65	41
Quizalofop <sup>b</sup>	0.06	30	94	94	98	81	0
LSD (P=0.05)		8	11	9	21	22	5

<sup>a</sup> Applied with crop oil concentrate at 1 pt./a.

<sup>b</sup> Applied with nonionic surfactant at 0.25% v/v.

<sup>c</sup> Applied with TF8035 surfactant at 0.5% v/v.

98JPY022. Broadleaf weed control in timothy for hay.

This study was conducted to evaluate labeled and non-labeled products for broadleaf weed control and crop response in timothy for hay. The purpose was to determine the potential for products alternative to growth regulating herbicides. The site was an established stand of timothy with a mix of dandelion and alfalfa.

Timothy showed excellent tolerance to all treatments with the exception of the higher rates of tribenuron and thifensulfuron and a reduced rate of thifensulfuron in combination with 2,4-D. In that situation, injury was primarily due to the thifensulfuron rather than the 2,4-D.

Dandelion and alfalfa control ratings were taken one month following treatment and in the regrowth following timothy hay harvest. Results were variable due to an inconsistent weed infestation, but good control of dandelion was observed with metsulfuron alone and in combination with dicamba or 2,4-D. Tribenuron also provided good control of dandelion, but injury to the timothy was excessive. Good control of alfalfa in the regrowth was seen with a treatment of MCPA-ester plus dicamba and mesulfuron plus 2,4-D. Also, good control was observed with combinations of 2,4-D plus melsulfuron or tribenuron, but this was probably due to the activity of the 2,4-D.

98JPY022. Broadleaf weed control in timothy for hay.

Location: Ellensburg

Cooperator: Steve Rosbach

Crop Information

Variety: Timothy hay

Application Information

	<u>POST</u>
Treatment Date	4/13/98
Air Temperature	43 F
Relative Humidity	70%
Wind Velocity	3 mph West
Soil Temperature	46 F
Soil Moisture	Damp
Cloud Cover	55%
Crop Stage	Vegetative
Height	4 inches
Gal/Acre	10
Pressure	31
Nozzles	XR8001

98JPY022. Broadleaf weed control in timothy for hay.

Treatment	Rate	Timothy	Dandelion		Alfalfa	
		Injury	Control			
		5/17	5/17	7/10	5/17	7/10
	lbs a.i./A	----- % -----				
Weedy Check		0	0	0	0	0
MCPA-Ester + Dicamba	0.5 + 0.125	6	61	65	92	89
Metsulfuron*	0.0038	6	88	89	92	59
Metsulfuron + Dicamba*	0.001875 + 0.0625	2	92	89	90	63
Metsulfuron 2,4-D Ester*	0.001875 + 0.25	5	88	85	88	88
Fluoxypyr + Dicamba	0.125 + 0.0625	1	49	61	77	66
Fluoxypyr + 2,4-D Ester*	0.125 + 0.25	1	83	62	88	72
Tribenuron methyl*	0.016	16	83	88	89	50
Tribenuron methyl + 2,4-D Ester*	0.008 + 0.25	4	84	71	91	83
Thifensulfuron*	0.0234	44	19	34	55	55
Thifensulfuron + 2,4-D Ester*	0.0125 + 0.25	19	47	25	77	63
Quinclorac*	0.25	1	8	38	93	45
LSD (P=.05)		8	26	22	18	40

\* Applied with 0.25% nonionic surfactant.

98JPY023. Puma Efficacy in Combination with Broadleaf Herbicides.

This study was conducted to determine if antagonism occurred when Puma was tankmixed with broadleaf herbicides.

Compared to Puma applied alone, wild oat control was not reduced when Puma was tank-mixed with either Harmony Extra, Bronate, bromoxynil, or MCPA-ester. No significant crop injury was observed with any of these treatments. Puma controlled wild oat as good or better than Tiller, imazamethabenz, diclofop, and imazamethabenz + difenzoquat.

Spring wheat yield was significantly greater than the weedy check with all herbicide treatments. Yield was most greatly affected by the presence or absence of a broadleaf herbicide in the tankmix with the exception of imazamethabenz plus bronate which had the poorest wild oat control.

98JPY023. Puma Efficacy in Combination with Broadleaf Herbicides.

Location: Pullman

Cooperator: Keith Kopf

Crop Information

Planting Date: 4/01/98

Row Spacing: 7.5 in

Seeding Rate: 110 lbs/A

Variety: Unknown

Application Information

	<u>POST</u>
Treatment Date	5/11/98
Air Temperature	70 F
Relative Humidity	54%
Wind Velocity	5 mph West
Soil Temperature	72 F
Soil Moisture	Dry
Cloud Cover	20%
Crop Stage	N/A
Height	N/A
Gal/Acre	10
Pressure	34
Nozzles	XR8001

98JPY023. Puma Efficacy in Combination with Broadleaf Herbicides.

Name	Rate lbs a.i./A	Wild oats		Spring Wheat		
		Control		Injury		
		6/21	8/12	6/21	Yield	
		----- % -----				
Weedy Check		0	0	0	14.7	
Puma	0.1	97	95	3	33.6	
Puma + Harmony Extra	0.1 + 0.0144	98	96	0	40.0	
Puma + Bronate	0.1 + 1	98	92	0	35.6	
Puma + Bromoxynil	0.1 + 0.5	98	93	0	35.3	
Puma + MCPA-Ester	0.1 + 0.5	99	96	0	43.7	
Tiller + Bromoxynil	0.58 + 0.5	95	91	0	40.1	
Imazamethabenz Bronate	0.41 + 1	87	40	0	31.6	
Diclofop	1	96	92	0	33.6	
Imazamethabenz Difenzoquat	0.23 + 0.5	90	62	0	34.1	
LSD (P=.05)		5	11	NS	8.7	

98JPY024. Control of Russian thistle with fluroxypyr herbicide.

This study was designed to test weed control efficacy and crop response to different prepackage mixes of fluroxypyr plus 2,4-D ester, MCP ester, or bromoxynil.

Good to excellent control of Russian thistle was seen with all treatments. However, the prepackage of fluroxypyr plus MCP ester had less activity on Russian thistle. Significant crop injury was observed when fluroxypyr plus 2,4-D ester or MCP ester was applied to spring wheat in the 2-3 leaf growth stage. Injury was most likely due to the phenoxy prepackage partner rather than the fluroxypyr.

Yields were poor and not significantly different for herbicide treatments at this site due to dry conditions following planting and an ACCase herbicide resistant wild oat infestation.

98JPY024. Control of Russian thistle with fluroxypyr herbicide.

Location: Endicott

Cooperator: Cleter Hughes

Crop Information

Planting Date: 4/20/98

Row Spacing: 7 in

Seeding Rate: 83 lbs/A

Variety: Penawawa

Application Information

	<u>Early POST</u>	<u>Mid POST</u>	<u>Late POST</u>
Treatment Date	5/12/98	6/01/98	6/21/98
Air Temperature	65 F	72 F	79 F
Relative Humidity	70%	56%	48%
Wind Velocity	2 mph South	5 mph South	3 mph NEast
Soil Temperature	62 F	70 F	84 F
Soil Moisture	Dry	Moist	Dry
Cloud Cover	40%	10%	17%
Crop Stage	2-3 leaf	tillering	Joint-heading
Height	N/A	6-8 inches	N/A
Gal/Acre	10	10	10
Pressure	32	32	34
Nozzles	XR8001	XR8001	XR8001

98JPY024. Control of Russian thistle with fluroxypyr herbicide.

Treatment	Rate	Timing	Russian thistle		Spring Wheat	
			Control		Crop Injury	
			6/26	7/14	6/26	7/14
	lbs. a.i./A		----- % -----			
Weedy Check			0	0	0	0
fluroxypyr + 2,4-D Ester	0.14 + 0.54	Early post	98	89	14	17
fluroxypyr + MCP	0.13 + 0.53	Early post	88	75	0	4
fluroxypyr + bromoxynil	0.12 + 0.36	Early post	98	85	0	0
fluroxypyr + 2,4-D Ester + Harmony Extra*	0.11 + 0.41 + 0.5 oz.	Early post	91	86	0	2
fluroxypyr + MCP + Harmony Extra*	0.10 + 0.4+ 0.5 oz.	Early post	98	86	2	0
bromoxynil + MCP + Harmony Extra	.375 + .375 + 0.5 oz.	Early post	96	89	4	0

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98JPY024. Control of Russian thistle with fluroxypyr herbicide.

(continued)

Treatment	Rate	Timing	Russian thistle		Spring Wheat	
			Control		Crop Injury	
			6/26	7/14	6/26	7/14
	lbs. a.i./A		----- % -----			
fluroxypyr + 2,4-D Ester	0.14 + 0.54	Mid post	98	90	0	0
fluroxypyr + MCP	0.13 + 0.53	Mid post	89	81	0	0
fluroxypyr + bromoxynil	0.12 + 0.36	Mid post	98	90	0	1
fluroxypyr + 2,4-D Ester + Harmony Extra*	0.11 + 0.41 + 0.5 oz.	Mid post	96	90	0	0
fluroxypyr + MCP + Harmony Extra*	0.10 + 0.4+ 0.5 oz.	Mid post	98	86	1	0
Clarity MCPA-Ester	0.125 + 0.25	Mid post	96	89	0	0
fluroxypyr + 2,4-D Ester	0.14 + 0.54	Late post	80	83	4	0
fluroxypyr + MCP	0.13 + 0.53	Late post	77	81	2	0
fluroxypyr + bromoxynil	0.12 + 0.36	Late post	75	90	2	0
fluroxypyr + 2,4-D Ester + Harmony Extra*	0.11 + 0.41 + 0.5 oz.	Late post	83	89	3	1
fluroxypyr + MCP + Harmony Extra*	0.10 + 0.4+ 0.5 oz.	Late post	75	85	0	0
<b>LSD (P=.05)</b>			<b>13</b>	<b>7</b>	<b>4</b>	<b>2</b>

\*Applied with 0.25% v/v nonionic surfactant

98JPY026. Grassy weed control in peas with Select.

This study was established to determine wild oat efficacy of clethodim in field peas. Excellent wild oat control was seen with clethodim alone and in combination with broadleaf herbicides. Some unexplained injury was noted with the 0.094 lbs. a.i. clethodim/A rate. This injury was greater with the lower rate of clethodim and did not occur when tankmixed with bentazon. Greatest pea yields were seen with 0.125 clethodim plus 0.5 lbs. a.i. bentazon/A.

98JPY026. Grassy weed control in peas with Select.

Location: Pullman  
Cooperator: USDA

Crop Information

Planting Date: 4/28/98  
Row Spacing: 10 inch  
Seeding Rate: 230lbs/A  
Variety: Columbia peas

Application Information

	<u>Postemergence</u>
Treatment Date	5/28/98
Air Temperature	80 F
Relative Humidity	50%
Wind Velocity	5 mph South
Soil Temperature	60 F
Soil Moisture	Moist
Cloud Cover	15%
Crop Stage	6-8 nodes
Height	6-8 inches
Gal/Acre	10
Pressure	34
Nozzles	XR8001

98JPY026. Grassy weed control in peas with Select.

Treatment	Rate	Wild Oats		Peas		Yield
		Control		Injury		
		6/25	8/8	6/14	6/25	
	lbs a.i./A	----- % -----				lbs/A
Weedy Check		0	0	0	0	1104
Clethodim*	0.094	99	99	18	9	752
Clethodim*	0.125	99	99	9	4	1372
Clethodim + Bentazon*	0.094 + 0.5	99	99	0	1	1278
Clethodim + Bentazon*	0.125 + 0.5	99	99	0	0	1574
Clethodim + Bentazon*	0.094 + 1	99	99	0	1	1030
Imazamox**	0.032	98	98	5	4	722
quazalafop + Bentazon*	0.04375 + 1	95	98	8	2	939
LSD (P=.05)		1	1	3	3	298

\* applied with 1 pt./A crop oil concentrate.

\*\* applied with 0.25 % v/v nonionic surfactant

97FLY001. Jointed goatgrass control with imazamox in imidazolinone resistant winter wheat.

This study was initiated to determine jointed goatgrass control in Fidel imidazolinone resistant winter wheat with imazamox.

Imazamox was applied either fall, spring, or fall plus spring at various rates. Jointed goatgrass control and crop injury was visually estimated on July 23, 1998. Crop injury ratings were not significantly different (data not shown). Jointed goatgrass control was estimated at 99 or 100% for all rates and timings except 0.024 lbs. a.i./A applied in the spring which had an estimated control of 90%. All imazamox treatments yielded significantly greater than the weedy check, but not different from one another. Similarly, all imazamox treatments had a greater test weight than the weedy check but not from one another. Reduced test weight can be caused by jointed goatgrass contamination and has been used as a measurement of control for jointed goatgrass.

97FLY001. Jointed goatgrass control with imazamox in imidazolinone resistant winter wheat.

Location: USDA-ARS, Palouse Conservation Farm, Pullman, WA  
Cooperator: USDA-ARS

Crop Information

Planting Date: 10/16/97  
Row Spacing: 7 in  
Seeding Rate: 82 lbs/A  
Variety: Fidel

Application Information

	Winter	Spring
Date	1/31/98	4/23/98
Air Temperature	46 F	48 F
Relative Humidity	49 %	60 %
Wind Velocity	6 mph	5 mph
Soil Temperature	39 F	40 F
Soil Moisture	saturated	adequate
Cloud Cover	0 %	35 %
Crop Stage	3 leaf	3-6 tillers
Height	4 in.	7 in.
Gal/Acre	10	10
Pressure	16 psi	19 psi
Nozzles	65015	65015

97FLY001. Jointed goatgrass control with imazamox in imidazolinone resistant winter wheat.

Treatment	Rate	Application timing	Jointed goatgrass control		Winter wheat	
			July 23	Yield	Test wt.	
	lbs. a.i./A		----- % -----	bu/A	lbs/bu	
Weedy check			0	81.6	61	
Imazamox	0.032	Winter	99	91.9	62	
Imazamox	0.064	Winter	99	94.4	62	
Imazamox	0.024	Spring	90	92.2	61.8	
Imazamox	0.032	Spring	100	92.3	61.9	
Imazamox	0.04	Spring	100	92.6	62.1	
Imazamox	0.048	Spring	100	90.4	62.1	
Imazamox	0.063	Spring	100	95.4	61.7	
Imazamox +	0.032 +	Fall	100	93.8	61.8	
Imazamox	0.032	Spring				
LSD (P=0.05)			10	6.1	0.4	

\* All treatments applied with 2.5% v/v Prefer 28.