1984 NORTH DAKOTA WEED CONTROL RESEARCH

WEED SCIENCE

BIOLOGICAL CULTURAL

CHEMICAL

NDSU

Weed Research Projects, Department of Agronomy
NORTH DAKOTA STATE UNIVERSITY
Fargo, N. D. 58105

Not for publication

SUMMARY OF 1984
WEED CONTROL TRIALS

Department of Agronomy
North Dakota State University
Fargo, North Dakota

John D. Nalewaja
G. R. Gillespie
C. G. Messersmith
R. G. Lym

Department of Agronomy - Extension
North Dakota State University - University of Minnesota

A. G. Dexter

Technicians

R. R. Roach
J. L. Luecke
K. Christianson

Graduate Research Fellows

D. Peterson
D. A. Reynolds

Graduate Research Assistants

M. Dossekou
M. Durgan
M. Fanning
Z. Fore
L. Grafstrom
M. Hickman
F. Manthey
R. Mohan
A. Moses
K. Moxness
D. Nicolai
D. Nord
K. Thorsness

Trials conducted in cooperation with:

Curt Thompson, Minot Experiment Station
Neil Riveland, Williston Experiment Station
John Lukach, Langdon Experiment Station
John Gardner, Carrington Experiment Station
John Leppert, Sarles, ND

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CLIMATIC DATA - FARGO

Date	Precipitation					Temperature									
	April	May	June	July	Aug.	April		May		June		July		August	
						Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1			T	.22		50	32	53	28	75	47	77	55	87	64
2						55	29	56	27	78	41	88	66	85	63
3			T			54	31	61	35	81	48	82	57	83	65
4		T	.63	T		57	27	63	36	68	57	78	52	79	70
5		T	T	T		60	29	63	41	70	56	73	52	89	64
6		.23	.70			62	30	54	44	75	59	70	43	95	70
7			1.60	T	T	60	40	47	32	77	56	75	48	92	68
8	T		1.67	.01		49	43	56	30	68	57	88	64	91	63
9		T		.01		51	42	62	28	68	50	87	66	84	57
10	.12	T				50	45	71	46	65	49	85	64	81	56
11	.30		.07			48	44	62	42	60	44	86	58	85	65
12	.28	.07	.02			45	43	66	33	76	59	90	60	101	68
13	.02					52	42	62	43	72	54	90	68	102	70
14			.09		.04	59	36	70	35	70	50	85	62	88	70
15			.23			60	32	73	50	78	62	79	56	80	60
16			T	.39		62	30	85	60	77	69	76	54	87	60
17		T	.01			59	29	76	55	81	64	77	49	88	64
18						64	27	79	48	77	56	82	54	84	55
19			.22			66	33	72	43	65	58	82	61	87	55
20		.05			.14	68	39	84	42	79	55	85	54	71	62
21		.26	.01			67	37	65	47	80	68	90	66	83	53
22			.07	.01		67	29	70	41	79	65	92	61	71	52
23				T		71	33	75	39	75	55	79	55	77	48
24	.18				T	61	40	71	49	80	51	80	57	80	60
25	.02			T		61	33	56	42	87	60	78	58	87	65
26	.43		T			52	45	63	33	73	58	83	55	93	68
27	.28		.06			54	28	67	36	80	54	85	58	100	63
28	.05		T			42	27	69	34	81	62	86	63	100	62
29					T	48	30	72	42	80	59	88	62	82	51
30				T		47	31	81	48	83	62	84	68	77	51
31					T			90	58			85	66	69	47

CLIMATIC DATA - CASSELTON

	Precipitation					Temperature									
						April		May		June		July		August	
Date	April	May	June	July	Aug.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1				.43				56	29	78	58	79	60	89	64
2			.01					60	27	74	43	91	56	94	61
3								64	37	84	45	85	52	91	64
4		.33						65	37	81	45	78	51	85	68
5			T					66	40	66	54	78	43	78	71
6		.38	.85					58	43	73	54	72	44	92	66
7			2.08					47	35	75	54	77	62	96	64
8			.72					59	29	76	60	91	62	91	61
9								63	29	76	50	91	64	95	57
10				.02				74	45	68	49	88	54	87	55
11								67	42	57	43	90	56	85	60
12			.15					69	33	60	43	93	63	87	66
13		.08						67	33	77	51	95	67	102	67
14			.17					73	37	77	51	95	58	103	73
15					.05			73	49	72	58	65	53	89	61
16				T				88	56	81	62	77	51	82	51
17				.43				79	60	87	67	79	52	89	62
18								72	48	87	58	85	59	90	55
19			.16					72	42	81	57	81	50	86	50
20		.35	.16					87	42	66	55	85	55	88	67
21			T		.20			66	55	79	63	95	58	75	52
22				.04				72	41	83	61	97	54	85	49
23			.16					78	38	80	52	81	58	74	40
24								74	54	77	54	82	51	78	44
25				T				57	41	84	54	83	53	84	44
26								65	34	86	58	87	53	91	64
27			.01					71	34	78	53	89	58	97	60
28			.09					73	35	85	61	89	60	103	58
29								77	40	83	58	91	67	103	58
30								82	46			86	65	83	47
31				T				92	51					79	45

CLIMATIC DATA - CROOKSTON

Date	Precipitation					Temperature									
	April	May	June	July	Aug.	April		May		June		July		August	
						Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1				.11				41	31	75	47	77	55	88	61
2								50	24	78	45	87	57	89	60
3			.01					55	29	83	57	79	55	88	59
4			.58		.03			59	36	68	55	88	67	78	63
5			.31					64	35	67	55	77	43	88	68
6		T	.64					64	40	76	52	70	44	96	68
7		.35	3.28	.11	.75			51	34	77	57	75	59	85	63
8			.83	.15	.01			47	30	60	50	85	61	85	57
9					T			55	28	64	47	83	59	81	56
10		T	T					62	39	65	44	84	59	77	57
11			.02					70	43	63	54	86	53	84	65
12			T					57	28	73	52	90	64	93	68
13		T			T			63	35	69	48	90	67	100	70
14			.04		T			63	32	68	53	83	57	88	57
15								70	39	78	59	78	55	79	51
16			.05					76	59	76	66	79	51	86	61
17			.08					82	61	82	57	75	49	85	52
18			.04					77	50	76	55	88	59	84	53
19			T					78	44	70	55	81	52	87	64
20					1.23			64	40	79	60	84	61	70	53
21		.44						81	44	79	63	87	71	79	49
22				.05				67	46	79	54	86	56	70	48
23			T					65	41	75	52	80	50	75	52
24								76	56	79	56	79	50	80	59
25		T	.97					71	39	86	61	77	51	85	61
26		T	.09					55	29	70	54	83	54	93	62
27			T					63	34	78	61	85	59	93	59
28					.01			69	37	81	51	81	62	98	53
29				.01				69	40	81	59	87	68	76	51
30			.17	.05				75	50	82	54	80	65	74	47
31					.06			82	58			84	63	70	50

CLIMATIC DATA - MINOT

	Precipitation					Temperature									
						April		May		June		July		August	
Date	April	May	June	July	Aug.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1			T	.05		51	27	45	25	86	51	72	48	81	58
2			T			52	29	52	23	70	49	81	56	85	59
3						53	29	52	29	76	45	84	53	89	61
4				T	T	59	31	56	33	79	49	79	53	85	59
5		.08	.68	.03		62	32	55	32	58	51	76	55	88	66
6		T	.01	T	.11	61	33	59	35	70	52	73	44	90	62
7			.50		.55	64	39	59	27	64	52	75	45	93	62
8	T	T	.13	.09		56	34	51	30	79	52	78	52	88	55
9			.34			59	41	55	32	64	47	87	51	78	53
10	.38		.05			47	41	61	40	62	43	84	53	81	53
11	.52					47	42	65	37	64	44	84	54	85	54
12	.34		.03			41	38	62	37	61	46	89	57	93	63
13	.92	T	.03			48	33	75	37	68	45	94	61	91	62
14			.25	T	.12	55	35	67	41	75	48	95	55	97	62
15			.02		T	58	29	73	42	64	53	81	51	88	52
16			.02	.13		61	29	74	52	79	53	84	56	82	52
17			.05			59	32	87	50	85	60	78	47	89	62
18						62	28	70	47	79	48	79	47	86	59
19						65	31	74	44	78	50	92	54	87	62
20					.18	65	34	74	44	75	52	86	53	88	62
21		.05	.41	.02		68	38	76	45	77	55	96	60	79	51
22		T	.44	T		69	32	69	41	84	59	92	64	73	41
23	.08		T			71	34	62	41	77	54	79	55	74	45
24						60	40	79	43	75	52	78	57	86	55
25				.04		55	34	60	34	83	62	79	60	92	57
26	1.38	T				54	30	50	30	90	57	80	57	96	57
27	1.52		.02			39	24	63	33	77	51	88	58	93	63
28			T			41	20	68	39	78	53	89	58	96	61
29						37	19	69	48	84	54	91	67	88	46
30				.15		37	23	78	49	84	58	96	69	74	47
31				T				90	54			94	63	67	47

CLIMATIC DATA - WILLISTON

Date	Precipitation April	Precipitation May	Precipitation June	Precipitation July	Precipitation Aug.	Temperature April Max.	Temperature April Min.	Temperature May Max.	Temperature May Min.	Temperature June Max.	Temperature June Min.	Temperature July Max.	Temperature July Min.	Temperature August Max.	Temperature August Min.
1						51	25	56	25	69	50	84	47	87	58
2					.52	51	24	56	29	75	47	85	58	88	66
3		T				54	31	63	35	78	41	84	55	83	68
4		.02				62	28	59	35	79	46	80	52	92	63
5			.12			68	33	62	31	70	54	77	57	98	70
6			.23		.10	67	38	60	30	71	55	84	54	95	65
7	T	T		.30		65	36	53	22	76	48	87	64	95	63
8			.21		T	68	30	56	23	69	53	88	60	88	57
9			T			64	42	67	41	65	46	89	53	83	52
10	T		T			59	39	68	38	66	46	88	59	91	57
11			.29			57	35	65	34	66	46	94	55	99	63
12	.06		T			58	37	74	43	68	50	98	61	98	69
13	T			.06		52	38	74	37	78	47	97	62	100	65
14		T	.50		.29	61	32	73	55	75	56	88	52	99	61
15		T	.03			62	29	79	55	80	54	89	52	89	59
16						69	36	88	56	86	56	86	57	92	64
17		.37			.02	69	43	88	45	84	52	83	47	92	63
18			T			69	36	70	47	78	47	97	60	93	65
19					T	68	37	76	43	79	49	95	62	92	66
20		.09		.10		67	32	77	57	80	59	101	63	90	56
21			.43			68	35	68	45	79	60	101	70	81	52
22			.50			70	45	66	40	80	56	95	58	80	45
23						66	28	84	38	75	52	79	59	95	59
24	T			.06		57	34	80	45	84	52	78	60	96	68
25						53	29	53	31	89	60	87	63	97	62
26	.15		T			49	26	66	34	89	57	90	57	97	70
27	.17					31	20	68	37	86	52	92	59	98	62
28	T	T				48	20	72	46	87	57	97	64	97	64
29						49	21	84	41	91	60	104	70	76	50
30						50	24	97	55	89	59	100	70	75	45
31					.09			99	61			91	63	72	52

CLIMATIC DATA - LANGDON

Date	Precipitation April	Precipitation May	Precipitation June	Precipitation July	Precipitation Aug.	April Max.	April Min.	May Max.	May Min.	June Max.	June Min.	July Max.	July Min.	August Max.	August Min.
1			.06	.17	.03	46	26	39	24	92	46	82	49	80	60
2			T	.06		50	27	46	25	63	41	74	53	82	60
3						53	30	49	27	73	34	83	48	84	60
4			T			53	32	56	35	78	44	80	49	81	59
5			.18			56	33	55	33	58	50	75	48	78	58
6			.02			59	31	54	32	62	51	75	39	87	63
7			.61			59	37	55	28	68	51	65	45	91	64
8			1.36	.69	.04	55	38	43	23	76	55	70	52	82	55
9			.57		.01	49	37	54	24	59	48	84	53	77	51
10		.05				50	31	59	23	60	38	81	53	77	55
11	.15			.02		50	36	62	31	64	40	81	54	71	55
12	.58		.09			45	38	52	27	63	52	84	57	86	59
13	.04	.06	.09	.61		44	32	60	34	65	44	89	58	86	62
14				.87		50	31	60	34	67	40	82	57	97	68
15						49	27	67	38	68	49	73	51	85	50
16			.19	.11		57	28	75	43	70	50	78	54	77	53
17				.02		59	27	88	54	81	58	73	46	88	57
18						57	28	71	54	79	52	75	51	80	49
19		.18				64	33	73	40	75	56	85	51	85	54
20		.03			.33	62	34	59	36	73	50	79	53	88	62
21		.32			.09	66	32	70	43	77	57	77	60	75	48
22		.09	T	.04		68	34	64	36	83	58	78	65	71	42
23		.02				68	33	56	37	79	49	81	51	69	42
24	.10	.05				69	41	75	37	69	47	79	50	79	50
25		.01				57	41	60	34	78	54	78	52	81	58
26			.02	.05		57	29	50	31	88	52	76	54	93	61
27	.52		.18			36	25	59	32	71	51	81	55	96	54
28	.38		.02			30	19	60	36	77	54	83	57	96	55
29						31	19	69	41	78	53	87	62	92	41
30				.50		35	22	76	50	78	52	83	65	74	50
31				.17				86	55			83	63	70	45

CLIMATIC DATA - CARRINGTON

Date	Precipitation April	Precipitation May	Precipitation June	Precipitation July	Precipitation Aug.	Temperature April Max.	April Min.	May Max.	May Min.	June Max.	June Min.	July Max.	July Min.	August Max.	August Min.
1			.03	.27				52	34	62	49	74	51	85	64
2				.03				55	28	77	42	84	63	89	59
3					.23			56	30	81	40	77	51	78	63
4		.51	.43					56	40	62	56	77	50	74	67
5								59	36	65	54	72	49	90	65
6		.03	.03		.11			55	37	64	54	72	40	93	65
7			.27					47	31	77	49	74	52	89	64
8			.51					54	31	64	53	88	54	88	54
9								59	29	63	46	85	54	81	53
10				.03				65	38	65	44	84	57	83	49
11			.03					59	40	59	42	87	53	89	57
12								70	40	71	54	89	55	102	63
13				.03				63	41	73	45	93	62	98	63
14			.07					71	37	69	53	81	57	86	65
15			.03					71	50	81	55	80	53	82	49
16				.15				87	58	85	64	79	53	88	56
17						59	30	74	53	83	62	78	47	84	59
18						62	27	76	51	79	52	86	51	87	50
19			.39			62	30	74	46	67	56	85	58	87	54
20		.15			.90	63	36	81	44	73	57	89	54	75	56
21			.27			66	33	64	46	82	64	92	65	76	52
22			.27			68	33	64	39	78	55	79	54	70	44
23			.03			70	34	77	41	74	52	77	52	80	43
24	.15					57	37	67	46	81	51	81	58	84	60
25						56	33	54	36	87	60	80	54	97	59
26	.62					46	33	63	28	77	55	85	49	93	62
27	.90					33	22	67	34	83	50	90	57	96	59
28	.07					39	22	72	33	82	60	88	56	94	51
29						37	27	74	46	84	55	91	63	76	48
30			.55			41	28	84	54	83	54	93	67	74	46
31								91	56			85	65	67	44

KEY TO ABBREVIATIONS AND EVALUATIONS

Crop injury, crop stand and weed control ratings are based on a visual estimate using a scale of 0 to 100 with 0 = no effect and 100 = complete kill.

All preplant incorporated or preemergence treatments were applied in 17 gpa of water and all postemergence treatments were applied in 8.5 gpa of water at 35 psi, except where stated otherwise.

All treatments were applied with a bicycle wheel-type plot sprayer unless otherwise stated. Preplant incorporation was by field cultivator + harrow or as stated in table and preemergence incorporation was by harrowing twice.

Treatments with a + indicate tank mixtures, with an α indicate formulation mixtures and with a / indicate a separate application.

Species

Abwo = Absinth wormwood
Barl (Bar) = Barley
Bdlf = Broadleaf
Bygr = Barnyardgrass
Cath = Canada thistle
Cobu = Common cocklebur
Colq = Common lambsquarter
Copu = Common purslane
Dobr = Downy brome
Fach = False chamomile
Flwe (Flix) = Flixweed
Fxtl = Foxtail species
Grft = Green foxtail
Grpw (Gfpw) = Greenflower pepperweed
Howe = Horseweed
Kocz = Kochia
Lesp = Leafy spurge
Mael = Marshelder
Mats = Marestail
Mesa = Meadow salsify
Nfcf = Nightflowering catchfly
Pest (Soth) = Perennial sowthistle
Powe = Pondweed
Prlt = Prickly lettuce
Prpw = Prostrate pigweed
Rrpw = Redroot pigweed
Ruth = Russian thistle
Soyb (Sobe) = Soybean
Sugb (Sube) = Sugarbeet
Sunf (Sufl) = Sunflower
Tamu = Tansy mustard
Taoa = Tame oat
Tumu = Tumble mustard
Tymu = Tame yellow mustard
VSF = Volunteer sunflower
Vwht = Volunteer wheat
Wht = Wheat
Wibu = Wild buckwheat
Wimu = Wild mustard
Wioa = Wild oats
Yeft = Yellow foxtail

Methods

PPI = Preplant incorporated
PEI = Preemergence incorporated
PE = Preemergence
P, PO, POST = Postemergence

Miscellaneous

DF = Dry flowable
F = Fall
FL (F) = Flowable
S = Spring
L = Liquid
G = Granules or gallon/A
Inc (I) = Incorporation
%ir = Percent injury rating
%sr (%std) = Percent stand reduction
HT = Plant height
DMA = Dimethylamine
DEA = Diethylamine
BEE = Butoxyethanol ester
UC = Union Carbide
Bivt = Bivert
RH = Rhom and Haas
DM = Surfactant by Am. Cyanamid
SOSA = Soybean oil with 15% emulsifier
SOTM = Soybean oil with 5.5% TMULZ VO
TM, LOTM = Linseed oil with 5.5 TMULZ VO
MOIS = Percent moisture
POSS, PO, OC = Petroleum oil concentrate (17% emulsifier)
Popl = Population
SPK = Spike stage
SURF, S = Surfactant
TW = Test weight
WP = Wettable powder
WK = Surfactant by DuPont
X-77 = Surfactant by Ortho
Yld = Yield
RP = Rhome-Poulenc
K = Potassium salt

LIST OF HERBICIDES TESTED IN 1984

Common Name or Code Name	Abbre-viation[a]	Chemical Name	Trade Name
AC-222,293	None	methyl 6-(4-isopropyl-4-methyl-5-oxo-2-2-imidazolin-2-yl)-m-toluate + methyl 2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-z-yl)-p-toluate	Assert
Imazaquin, AC-252,214	Imaq	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-quinolinecarboxylic acid	Scepter
Acetochlor	Acet	2-chloro-N(ethoxymethyl)-6'-ethyl-o-acetotoluidide	Harness
Acifluorfen	Acif	5-[2-chloro-4-(trifluoromethyl)-phenoxy]-2-nitrobenzoic acid	Blazer, Tackle
Alachlor	Alac	2-chloro-2',6'-diethyl-N-(methoxymethyl)acetanilide	Lasso
Ametryn	Amet	2-(ethylamino)-4-(isopropylamino)-6-(methylthio)-s-triazine	Evik
Amitrole	Amit	3-amino-s-triazole + ammonium thiocyanate methyl sulfanilycarbamate	Amitrole
Asulam	Asul	methyl sulfanilylcarbamate	Asulox
Atrazine	Atra	2-chloro-4-(ethylamino)-6-(isopropyl)-amino)-s-triazine	AAtrex
Benazolin	Bena	4-chloro-2-oxo-3-benzothiazoline acetic acid	None
Bentazon	Bent	3-isopropyl-1H-2,1,3-benzothiadiazin-4(3H)-one 2,2-dioxide	Basagran
Bromoxynil	Brox	3,5-dibromo-4-hydroxybenzonitrile	Brominal, Buctril
Buthidazole	Buth	3-[5(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-4-hydroxy-1-methyl-2-imidazolidinone	Ravage
Butylate	Buty	S-ethyl diisobutylthiocarbamate	Sutan
Chloramben	Clam	3-amino-2,5-dichlorobenzoic acid	Amiben
Chlorpropham	CIPC	isopropyl-m-chlorocarbanilate	Furloe

Common Name or Code Name	Abbreviation[a]	Chemical Name	Trade Name
Chlorsulfuron	Clsu	2-chloro-N-[[(4-methoxy-6-methyl-1,3,5-triazine-2-yl)amino]carbonyl] benzene-sulfonamide	Glean
Clopyralid		3,6-dichloro-2-pyridinecarboxylic acid	Lontrel
Cyanazine	Cyan	2-[[4-chloro-6-(ethylamino)-s-triazine-2-yl]amino]-2-methylpropionitrile	Bladex
Cycloate	Cycl	S-ethyl N-ethylthiocyclohexane-carbamate	Ro-Neet
Dalapon	Dala	2,2-dichloropropionic acid	Dowpon
Desmedipham	Desm	ethyl m-hydroxycarbanilate carbanilate (ester)	Betanex
Diallate	Dial	S-(2,3-dichloroally)diisopropylthiocarbamate	Avadex
Dicamba	Dica	3,6-dichloro-o-anisic acid	Banvel
Dikegulac sodium	None	2,3:4,6-bis-o-[1-methylylethylidene] -a-L-xylo-2-hexulofuranosonic acid	Atrinal
Diclofop	Dicl	2-[4-(2,4-dichlorophenoxy)phenoxy] propanoic acid	Hoelon
Diethatyl	Diet	N-(chloroacetyl)-N-(2,6-diethylphenyl) -glycine	Antor
Difenzoquat	Dife	1,2-dimethyl-3,5-diphenyl-1H-pyrazolium	Avenge
Dinoseb	Dino	2-sec-butyl-4,6-dinitrophenol	Dow General, Premerge
Diuron	Diur	3-(3,4-dichlorophenyl)-1,1-dimethylurea	Karmax
Dowco 290, Clopyralid		3,6-dichloropicolinic acid	Lontrel
DPX-F6025		Ethyl-2-[[[[4-chloro-6-methyloxypyridmidin-2-yl]amino]carbonyl] amino]sulfonyl]benzoate	Classic

Common Name or Code Name	Abbre-viation[a]	Chemical Name	Trade Name
DPX-Y6202		2-[4-(6-chloro-2-quinoxalinyl)oxy] phenoxy propionic acid ethyl ester	Assure
DPX-M6316	DPX-M6	Not released	None
EH 540	None	2,4-D + mecaprop + dicamba (2.6 + 1.3+ 0.9 lb/gal)	Trimec-D
EH 541	None	MCPA + mecaprop + dicamba (2.3 + 1.04 + 0.52 lb/gal)	Trimec-D
Endothall	Endo	7-oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	Herbicide 273
EPTC	None	S-ethyl dipropylthiocarbamate	Eptam
Ethalfluralin	Etha	N-ethyl-N-(2-methyl-2-propenyl) -2,6-dinitro-4-(triflurormethyl) benzenamine	Sonalan
Ethofumesate	Etho	(±)2-ethoxy-2,3-dihydro-3,3-dimethyl -5-benzofuranyl methanesulfonate	Nortron
Fenac		(2,3,6-trichloropenyl)acetic acid	Fenatrol
Fluazifop	PP-009-FLUA-4 PP005-FLUA or 2	(±)-2-[4-[[5-corifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanic acid	
Glyphosate	Glyp	N-(phosphonomethyl)glycine	Roundup
Haloxyfop		2-[4-[[3-chloro-5-(trifluoromethyl) -2-pyridinyl]oxy]phenoxy]propanic acid	Verdict
Hexazinone	Hexa	3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1H,3H)-dione	Velpar
HOE-33171, Fenoxaprop	Feno	(±)-2-[4-[(6-chloro-2-benzoxazolyl) oxy]phenoxy]propionic acid	Whip
Linuron	Linu	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea	Lorox
MCPA,EH-786	None	[(4-chloro-o-tolyl)oxy]acetic acid	Numerous
MCPP	None	2-[(4-chloro-o-tolyl)oxy]propionic acid	Numerous
MO-070701	None	Not released	None

Common Name or Code Name	Abbre-viation[a]	Chemical Name	Trade Name
MO-070523	None	Not released	None
MO-070492	None	Not released	None
Metolachlor	Meto	2-chloro-N-(2-ethyl-6-methylphenyl) -N-(2-methoxy-1-methylethyl)acetamide	Dual
Metribuzin	Metr	4-amino-6-tert-butyl-3-(methylthio)-as-triazine-5(4H)one	Sencor, Lexone
Metsulfuron	Mets	2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino] sulfonyl]benzoic acid	Ally
Naptalam	Napt	N-1-napthylphtalamic acid	Alanap
Paraquat	Para	1,1'-dimethyl-4,4'-bipyridinium ion	Paraquat, Gramoxone
Pendimethalin	Pend	N-(1-ethylpropyl)-3,4-dimethyl-2,6-dimitrobenzenamine	Prowl
Phenmedipham	Phen	methyl m-hydroxycarbanilate m-methyl-carbanilate	Betanal
Picloram	Picl	4-amino-3,5,6-trichloropicolinic acid	Tordon
PP-021, Fomesafen		5-[2-chloro-4-(trifluormethyl)phenoxy] -N-(methylsulfonyl)-2-nitrobenzamide	Flex
PPG 844, Lactofen	None	1'-(carboxyethexy)ethyl 5- 3-chloro-4-(trifluoromethyl)phenoxy-2-nitrobenzoate	Cobra
PPG 1013	None	Not released	None
PPG 1259	None	Not released	None
Prodiamine	Prod	2,4-dinitro-N^3 N^3 -dipropyl -6-(trifluoromethyl)-1,3-benzenediamine	None
Prometryn	Prom	2,4-bis(isopropylamino)-6-(methylthio) -s-triazine	Caparol
Propachlor	Prcl	2-chloro-N-isopropylacetanilide	Bexton, Ramrod
Propanil	Prnl	3',4'-dichloropropionanilide	Stam, Stampede
Pyrazon	Pyra	5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone	Pyramin

Common Name or Code Name	Abbreviation[a]	Chemical Name	Trade Name
R-25788, Dichlormid		2,2-dichloro-N,N-di-2-proycryl-acetamide	None
R-33865, Diethol ate	Ext	O,O-diethyl-O-phenyl	None
R-40244 Fluorachloridone	Fluo	3-chlor-4-(chloromethyl)-1-[3-(trifluoromethyl)phenyl]-2-pyrrolidinone	Racer
RE36290, Clopropoxydim	None	(E,E)-2-1[111[1-[[(3-chloro-2-propanyl)oxy]imino]butyl]-5-[2-ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one	Selectone
SC-0224, Sulphosate	None	trimethylsulfarium carbonymethyl-aminomethyl phosphosate	Touchdown
SD-95481, Cynmethylin	None	exo-1-methyl-4-(111-methyl-ethyl)-2-[(2-methylphenyl)methoxy]-7-oxa bicyclo	
SC-1084	None	Not released	None
SC-15574	None	Not released	None
Sethoxydim	None	2-(N-ethoxybutyrimidoyl)-5-(2-ethylthiopropyl)-3-hydroxy-2-cyclohexen-1-one	Poast
TCA	None	trichloroacetic acid	None
Terbutryn	Terb	2-(tert-butylamino)-4-(ethylamino)-6-(methylthio)-s-triazine	Igran
Triallate	Tria	S-(2,3,3-trichloroallyl)diisopropyl-thiocarbamate	Far-go
Trifluralin	Trif	α,α, -trifluoro-2,6-dinitro-N-N-dipropyl-p-toluide	Treflan
2,4-D, EH-763	None	(2,4-dichlorophenoxy)acetic acid	Numerous
2,4-DP	None	2-(2,4-dichlorophenoxy)propionic acid	None
Vernolate	Vern	S-propyl dipropythiocarbamate	Vernam
VSC-438, Methazole	None	2-(3,4-dichlorophenyl)-4-methyl-1,2,4-oxadiazoline-3,5-dione	Probe

Common Name or Code Name	Abbre- viation[a]	Chemical Name	Trade Name
UC82042	None	Not released	None
Z-7653-A	None	Not released	None
UC-77179	None	Not released	None

[a] Abbreviations in the tables may consist of only the first one, two, or three listed letters when space was limited. Abbreviations of numbered compounds varies with available space, but usually was the first letters and numbers.

SOIL TEST RESULTS AT VARIOUS WEED TRIAL LOCATIONS

	Soil Texture	Organic Matter	PH	lb/A N	lb/A P	lb/A K
Section 22 Fargo	Silty clay	6.5	7.5	Applied 70 lb/A N		
Mainstation Fargo	Silty clay	6.7	7.5	Applied 70 lb/A N		
Sugarbeet weed free	Silty clay	5.8	7.1	357	67	1200
Sugarbeet wild oat	Silty clay	4.8	7.9	268	26	650
Casselton ND	Silty clay	4.0	7.9	Applied 80 lb/A N		
Glyndon MN	Loam	4.6	7.9	26	23	295
Crookston MN	Silt Loam	4.7	8.0	57	18	205
St. Thomas ND	Silt Loam	5.4	7.8	67	26	520
Robbin MN	Silty clay loam	7.4	8.2	76	52	620
Renville MN	Clay Loam	6.3	7.2	109	73	585
Hillsboro ND	Silty clay	5.3	7.4	245	20	750
Colfax ND	Loam	5.3	8.2	81	24	450
Langdon ND	Clay Loam	4.6	7.8	Fertilized by test		
Minot ND	Loam	2.7	7.0	Fertilized by test		
Williston ND	Loam	2.3	6.8	Fertilized by test		
Carrington ND	Loam	3.6	7.2	Fertilized by test		

Fall soil applied herbicides, Crookston, 1983-84. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots November 1, 1983 when the air temp.=61F, soil temp. six inches below soil surface=47F, and wind was SE 12-15 mph. Herbicides were incorporated with a rototiller set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Spring cultivation was harrowing twice May 10, 1984 before planting Bush Johnson 19 sugarbeet seed 1.25 inches deep in 22 inch rows. Wild mustard, wild oat, prostrate pigweed, green and yellow foxtail control and sugarbeet injury were evaluated June 22.

Treatment	Rate (lb/A)	Sgbt inj ratg	Wimu cntl ratg	Wioa cntl ratg	Prpw cntl ratg	Grft Yeft cntl ratg
		June 22 (%)				
Triallate	4	0	0	100	10	92
Triallate	8	0	8	100	25	96
Diallate	4	0	5	99	10	96
Diallate	8	0	0	99	49	98
EPTC+Diallate	4+4	3	10	100	30	97
EPTC+Diallate	4+2	0	5	97	21	84
EPTC+Diallate	4+1	0	0	89	14	45
EPTC+Ethofumesate	4+3	0	86	100	97	100
EPTC	4	0	0	13	5	40
Cycloate	4	0	10	91	13	83
Cycloate	6	0	30	89	30	94
Cycloate+Diallate	4+4	0	40	99	36	99
Mean		0	16	90	28	85
High mean		3	86	100	97	100
Low mean		0	0	13	5	40
Coeff. of variation		693	81	4	59	9
LSD(1 Percent)		3	25	8	32	15
LSD(5 Percent)		2	19	6	24	11
No. of reps		4	4	4	4	4

Summary

Diallate and triallate at 4 and 8 lb/A gave good control of wild oat and foxtail sp. but poor control of prostrate pigweed and wild mustard. Cycloate at 4 lb/A gave better control of wild oat and foxtail sp. than EPTC at 4 lb/A. EPTC + ethofumesate at 4+3 lb/A gave the best overall weed control.

Preplant incorporated herbicides, Colfax, 1984. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots May 4 when the air temp.=61F, soil temp. at six inches=47F, soil moisture in top four inches= 17%, and the wind was SW at 5 mph. Incorporation was with a rototiller set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Beta 1230 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 4. Sugarbeet injury was evaluated June 27.

Treatment	Rate (lb/A)	June 27 Sugarbeet injury rating -- (%) --
Diethatyl	6	3
Ethofumesate	3.75	0
EPTC	2.5	0
Cycloate	4	0
EPTC+Cycloate	2+2	1
Diallate	4	7
EPTC+Diallate	2.5+1	0
EPTC+Diallate	2.5+4	16
Diethatyl+Cycloate	4+3	10
Diethatyl+Diallate	4+4	17
Ethofumesate+Cycloate	3+3	0
Ethofumesate+Diallate	3+4	9
Diethatyl+EPTC+Cycloate	4+1+1.5	14
Diethatyl+EPTC	4+2	14
Mean		6
High mean		17
Low mean		0
Coeff. of variation		85
LSD(1 Percent)		10
LSD(5 Percent)		8
No. of reps		4

Summary

Weed populations were too erratic for evaluation. Addition of diallate at 4 lb/A to diethatyl, ethofumesate, or EPTC increased sugarbeet injury.

Preplant incorporated herbicides, Hillsboro, 1984. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots May 11 when the air temp.=60F, soil temp. at six inches=48F, wind was NW at 30 mph, and soil surface was moist with very moist subsoil. Incorporation was with a roto-tiller set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Beta 1230 sugarbeet seed was planted 1.25 inches deep in 22 inch rows on May 11. Redroot pigweed and yellow foxtail control were evaluated July 13.

Treatment	Rate (lb/A)	July 13 — Redroot Pigweed control rating (%)	July 13 — Yellow Foxtail control rating (%)
EPTC	3	5	80
Cycloate	4	0	94
EPTC+Cycloate	2+2	0	94
Diallate	4	0	95
Ethofumesate	3.75	64	65
Diethatyl	6	53	89
Ethofumesate+Cycloate	3+3	56	97
Ethofumesate+Cycloate	3.75+4	76	100
Diethatyl+Cycloate	4+3	53	98
Ethofumesate+EPTC+Cyclo	3.75+1.5+1.5	49	100
Ethofumesate+EPTC+Cycloate	3+1+1.5	67	99
Ethofumesate+Diallate	3.75+1	53	92
Ethofumesate+Diallate	3.75+4	74	96
Ethofumesate+TCA	3.75+6	64	73
Methazole	2	13	0
Mean		42	85
High mean		76	100
Low mean		0	0
Coeff. of variation		42	10
LSD(1 Percent)		33	16
LSD(5 Percent)		25	12
No. of reps		4	4

Summary

The plots were totally flooded from about June 8 to June 12. EPTC, ethofumesate, ethofumesate+TCA and methazole gave or tended to give less yellow foxtail control than the other treatments. Ethofumesate+diallate at 3.75+1 or 3.75+4 lb/A gave better yellow foxtail control than ethofumesate or ethofumesate+TCA. None of the treatments gave good redroot pigweed control. Perhaps the herbicide was leached from the upper soil profile before the shallow germinating redroot pigweed had started growth.

Preplant incorporated herbicides, Crookston, 1984. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots May 10 when the air temp.=61F, soil temp. at six inches=43F, soil moisture in top four inches=15%, wind was NW at 25 mph, and the sky was sunny and clear. Incorporation was with a rototiller set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Bush Johnson 19 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 10. Redroot pigweed, green and yellow foxtail control and sugarbeet injury were evaluated June 22.

		June 22		
Treatment	Rate (lb/A)	Sugarbeet injury rating	Gr. Foxtail Ye. Foxtail control rating	Redroot Pigweed control rating
		(%)		
Diethatyl	6	14	98	99
Ethofumesate	3.75	11	98	99
EPTC	2.5	21	99	76
Cycloate	4	13	98	93
EPTC+Cycloate	2+2	8	98	89
Diallate	4	11	95	83
EPTC+Diallate	2.5+1	0	97	86
EPTC+Diallate	2.5+4	5	96	91
Diethatyl+Diallate	6+1	11	96	99
Diethatyl+Diallate	4+4	15	99	98
Diethatyl+Cycloate	4+3	5	97	95
Ethofumesate+Diallate	3+4	24	99	98
Ethofumesate+Cycloate	3+3	8	96	99
Cycloate+Diallate	3+4	9	99	89
Mean		11	97	92
High mean		24	99	99
Low mean		0	95	76
Coeff. of variation		63	2	7
LSD(1 Percent)		13	3	12
LSD(5 Percent)		10	2	9
No. of reps		4	4	4

Summary

All treatments gave excellent foxtail sp. control. Cycloate at 4 lb/A gave better redroot pigweed control than EPTC at 2.5 lb/A. Treatments that contained ethofumesate or diethatyl gave or tended to give the best control of redroot pigweed.

Preplant incorporated herbicides, Renville, 1984. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots May 21 when the air temp.=70F, wind was west at 5 mph, and the sky was overcast. Incorporation was with a rototiller set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Beta 1230 sugarbeet seed was planted 1.25 inches deep in 22 inch rows on May 21. Wild proso millet control and sugarbeet injury were evaluated July 17.

Treatment	Rate (lb/A)	July 17: Sugarbeet injury rating (%)	July 17: Wild Proso Millet control rating (%)
Diethatyl	6	0	61
Ethofumesate	3.75	0	91
EPTC	2.5	3	84
Cycloate	4	0	55
EPTC+Cycloate	2+2	0	89
Diallate	4	0	35
EPTC+Diallate	2.5+1	0	76
EPTC+Diallate	2.5+4	8	94
Diethatyl+Cycloate	4+3	3	75
Diethatyl+Diallate	4+4	3	64
Ethofumesate+Cycloate	3+3	0	79
Ethofumesate+Diallate	3+4	0	92
Diethatyl+EPTC+Cycloate	4+1+1.5	5	91
Diethatyl+EPTC	4+2	0	80
Mean		1	76
High mean		8	94
Low mean		0	35
Coeff. of variation		254	18
LSD(1 Percent)		7	26
LSD(5 Percent)		5	20
No. of reps		4	4

Summary

Only ethofumesate at 3.75 lb/A, EPTC + diallate at 2.5+4 lb/A, ethofumesate + diallate at 3+4 lb/A, and diethatyl + EPTC + cycloate at 4+1+1.5 lb/A gave over 90% control of wild proso millet.

Preplant incorporated herbicides, Kittson County, 1984. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots April 23 when the air temp.=70F, soil temp. at six inches=48F, soil moisture in top four inches=17.5%, and wind was north 3-5 mph. Incorporation was with a rototiller set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Maribo Ultramono sugarbeet seed was planted 1.25 inches deep in 22 inch rows April 23. Marshelder control and sugarbeet injury were evaluated June 26.

		June 26	
Treatment	Rate (lb/A)	Sugarbeet injury rating	Marshelder control rating
		(%)	
Diethatyl	6	0	0
Ethofumesate	3.75	0	0
EPTC	2.5	0	0
Cycloate	4	0	0
EPTC+Cycloate	2+2	0	0
Diallate	4	0	0
EPTC+Diallate	2.5+1	0	0
EPTC+Diallate	2.5+4	0	0
Diethatyl+Diallate	6+1	0	0
Diethatyl+Diallate	4+4	0	0
Diethatyl+Cycloate	4+3	0	0
Ethofumesate+Diallate	3+4	4	0
Ethofumesate+Cycloate	3+3	6	3
Cycloate+Diallate	3+4	0	0
Mean		1	0
High mean		6	3
Low mean		0	0
Coeff. of variation		385	648
LSD(1 Percent)		5	4
LSD(5 Percent)		4	3
No. of reps		4	3

Summary

Herbicides caused no important sugarbeet injury and gave no control of marshelder.

Soil applied and postemergence herbicides, Renville, 1984. EPTC was applied and rototiller incorporated four inches deep May 21 when the air temp.=70F and the wind was west at 5 mph. Beta 1230 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 21. Preemergence treatments were applied following planting May 21. Heavy rain was falling while preemergence herbicides were being applied. The first half of split application postemergence treatments were applied 9:30 am June 26 (air temp.=85F, relative humidity=50%, soil moisture in top four inches=18.5%, wind west 8-10 mph) when sugarbeets were at the 6-8 leaf stage and yellow foxtail was 3-12 inches tall. Single application herbicide treatments and the second half of split application treatments were applied 9:00 am July 6 (air temp.=67F, soil temp. at six inches=70F, wind was NW 10-15 mph) when sugarbeets were 10-12 leaf and yellow foxtail was 8-18 inches tall. Preplant incorporated, preemergence, and postemergence herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Yellow foxtail control and sugarbeet injury were evaluated July 17.

Treatment*	Rate (lb/A)	July 17: Sugarbeet injury rating (%)	July 17: Yellow Foxtail control rating (%)
EPTC/Desmedipham&Phenmed 2X	2.5/.5	3	99
EPTC/Des&Phen+Dalapon 2X	2.5/.5+1	11	99
EPTC/Des&Phen+Etho 2X	2.5/.375+.75	5	100
Etho+TCE PRE/Des&Phen 2X	3.75+6/.5	0	91
Eth+TCA PRE/De&Ph+Dala 2X	3.75+6/.5+1	6	93
Et+TCA PRE/D&P+Eth 2X	3.75+6/.375+.75	0	75
Diet+TCA PRE/Desmed&Phenmed 2X	6+6/.5	0	98
Diet+TCA PRE/De&Ph+Dala 2X	6+6/.5+1	4	99
Diet+TCA PRE/D&P+Etho 2X	6+6/.375+.75	3	100
Desmedipham&Phenmedipham 2X	.5	0	50
Desmedipham 2X	.5	0	9
Desmed&Phenmed+Dalapon 2X	.5+1	8	63
Des&Phen+Ethofumesate 2X	.375+.75	0	59
D&P+Etho+Seth+OC 2X	.375+.75+.1+.25G	8	94
Sethoxydim+OC	.2+.25G	0	94
PP-005+OC	.125+.25G	0	68
PP-005+OC	.188+.25G	0	86
DPX-Y6202+OC	.1+.25G	0	96
Haloxyfop+OC	.1+.25G	0	97

Table continued on next page.

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Treatment*	Rate (lb/A)	Sugarbeet injury rating	Yellow Foxtail control rating
		--------- July 17 ---------	
		------------ (%) ------------	
De&Ph/De&Ph+Sethox+OC	.5/.5+.2+.25G	3	96
De&Ph/De&Ph+PP-005+OC	.5/.5+.188+.25G	0	93
De&Ph/D&P+DPX-Y6202+OC	.5/.5+.1+.25G	3	73
De&Ph/D&P+Haloxyfop+OC	.5/.5+.1+.25G	0	93
Desmed&Phenmed+Endothall 2X	.5+.25	3	43
DP+En/DP+En+S+O	.5+.25/.5+.25+.2+.25G	21	91
Desmedipham&Phenmedipham	1	0	41
Desmedipham&Phenmedipham+Dalapon	1+2	10	48
Desmed&Phenmed+Ethofumesate	.75+1.5	11	53
Des&Phen+Etho+Seth+OC	.75+1.5+.2+.25G	14	82
Mean		4	79
High mean		21	100
Low mean		0	9
Coeff. of variation		98	16
LSD(1 Percent)		7	23
LSD(5 Percent)		5	18
No. of reps		4	4

* OC = ATplus 411F

Summary

EPTC or diethatyl+TCA followed by postemergence herbicides gave or tended to give better control of yellow foxtail than ethofumesate+TCA followed by postemergence herbicides. PP-005 at 0.125 lb/A gave less control of yellow foxtail than sethoxydim, DPX-Y6202, or haloxyfop. Desmedipham+phenmedipham significantly antagonized yellow foxtail control from DPX-Y6202 but had no effect on control from sethoxydim, PP-005, or haloxyfop. Desmedipham+phenmedipham+endothall followed 10 days later by desmedipham+phenmedipham+endothall+sethoxydim+oil concentrate caused more sugarbeet injury than any other treatment.

Soil applied and postemergence herbicides, Kittson County, 1984. EPTC was applied and rototiller incorporated April 23 when the air temp.=70F, soil temp. at six inches=48F, and wind was north 3-5 mph. The rototiller was operated four inches deep. Maribo Ultramono sugarbeet seed was planted 1.25 inches deep in 22 inch rows April 23. Ethofumesate and diethatyl were applied preemergence after planting. The first half of postemergence treatments containing split applications were applied 12:30 pm June 12 (air temp.=68F, soil temp. at six inches=57F, relative humidity=76%, wind was SW at 3-6 mph, and sky was overcast) when sugarbeets were at the 4-6 leaf stage and marshelder was 4-6 leaf (1-2 inches tall). All single application treatments and the second half of split application treatments were applied 11:45 am June 18 (air temp.=77F, soil temp. at six inches=65F, wind was north 15-20 mph, relative humidity=39%, sky sunny and clear) when sugarbeets were 6 leaf and marshelder was 6 leaf (2-7 inches tall). All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Marshelder control and sugarbeet injury were evaluated June 26.

		-------- June 26 --------	
Treatment*	Rate (lb/A)	Sugarbeet injury rating	Marshelder control rating
		---------- (%) ----------	
EPTC/Desmedipham 2X	2.5/.5	4	100
EPTC/Desmedipham+Dalapon 2X	2.5/.5+1	19	98
EPTC/Desm+Ethofume 2X	2.5/.375+.75	16	-
Etho PRE/Desmedipham 2X	3.75/.5	3	93
Etho PRE/Desm+Dalapon 2X	3.75/.5+1	19	100
Etho PRE/Desm+Etho 2X	3.75/.375+.75	15	-
Diethatyl PRE/Desmedipham 2X	6/.5	5	93
Diethatyl PRE/Desm+Dalapon 2X	6/.5+1	14	-
Diethatyl PRE/Desm+Etho 2X	6/.375+.75	13	-
Desmedipham&Phenmedipham 2X	.5	4	95
Desmedipham 2X	.5	3	-
Desmedipham+Dalapon 2X	.5+1	13	99
Desm+Ethofumesate 2X	.375+.75	20	-
Des+Etho+Seth+OC 2X	.375+.75+.1+.25G	11	98
Desmedipham+Endothall 2X	.5+.25	0	80
Desmedipham	1	0	70
Desmedipham+Dalapon	1+2	15	-
Desmedipham+Ethofumesate	.75+1.5	11	80
Desm+Etho+Sethox+OC	.75+1.5+.2+.25G	8	75
Sethoxydim+OC	.2+.25G	0	0
PP-005+OC	.125+.25G	0	0
PP-005+OC	.188+.25G	0	0
DPX-Y6202+OC	.1+.25G	0	0
Haloxyfop+OC	.1+.25G	0	0
Desm/Desm+Sethox+OC	.5/.5+.2+.25G	3	98
Desm/Desm+PP-005+OC	.5/.5+.188+.25G	3	95
Desm/Desm+DPX-Y6202+OC	.5/.5+.1+.25G	5	-
Desm/Desm+Haloxyfop+OC	.5/.5+.1+.25G	1	98

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Treatment*	Rate (lb/A)	June 26 Sugarbeet injury rating	June 26 Marshelder control rating
		---------- (%) ----------	
Mean		7	69
High mean		20	100
Low mean		0	0
Coeff. of variation		82	8
LSD(1 Percent)		11	15
LSD(5 Percent)		8	11
No. of reps		4	2

* OC = ATplus 411F

Summary

Treatments which included desmedipham+dalapon or desmedipham+ethofumesate caused significant sugarbeet injury.

Soil applied and postemergence herbicides, Colfax, 1984. EPTC was applied and rototiller incorporated four inches deep on May 4 when the air temp.=61F, soil temp. at six inches=47F, wind was SW at 5 mph, and soil moisture in top four inches=17%. Beta 1230 sugarbeet seed was planted 1.25 inches deep in 22 inch rows on May 4. Ethofumesate and diethatyl were applied preemergence May 4 after planting. The first half of split application postemergence treatments was applied 3:00 pm June 10 (air temp.=66F, soil temp. at six inches=62F, relative humidity=53%, soil moisture in top four inches=17%, wind N 15-20 mph, sunny and clear) when sugarbeets were 4-6 leaf, redroot pigweed were 4 leaf, and green and yellow foxtail were 2-5 inches tall. All single application treatments and the second half of split application treatments were applied 3:00 pm June 14 (air temp.=71F, soil temp. at six inches=70F, wind SE 8-12 mph, relative humidity=69%) when sugarbeets were 4-8 leaf, redroot pigweed were 4-8 leaf, and green and yellow foxtail were 2-7 inches tall. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Sugarbeet injury was evaluated June 27. Green and yellow foxtail control and redroot pigweed control were evaluated July 9.

			----- July	9 -----
Treatment*	Rate (lb/A)	June 27 Sugarbeet injury rating	Gr & Ye Foxtail control rating	Redroot Pigweed control rating
		---------------	(%)	-------------
EPTC/Desmedipham 2X	2.5/.5	15	100	100
EPTC/Desmedipham+Dalapon 2X	2.5/.5+1	24	100	100
EPTC/Desm+Ethofume 2X	2.5/.375+.75	20	100	100
Etho PRE/Desmedipham 2X	3.75/.5	13	98	100
Etho PRE/Desm+Dalapon 2X	3.75/.5+1	18	100	100
Etho PRE/Desm+Etho 2X	3.75/.375+.75	14	100	100
Diethatyl PRE/Desmedipham 2X	6/.5	11	97	100
Diethatyl PRE/Desm+Dalapon 2X	6/.5+1	10	100	100
Diethatyl PRE/Desm+Etho 2X	6/.375+.75	14	98	100
Desmedipham&Phenmedipham 2X	.5	4	93	93
Desmedipham 2X	.5	5	73	99
Desmedipham+Dalapon 2X	.5+1	18	98	100
Desm+Ethofumesate 2X	.375+.75	9	94	100
Des+Etho+Seth+OC 2X	.375+.75+.1+.25G	9	100	100
Desmedipham+Endothall 2X	.5+.25	8	79	83
Desmedipham	1	1	61	85
Desmedipham+Dalapon	1+2	16	98	95
Desmedipham+Ethofumesate	.75+1.5	9	88	96
Desm+Etho+Sethox+OC	.75+1.5+.2+.25G	15	99	95
Sethoxydim+OC	.2+.25G	0	100	0
PP-005+OC	.125+.25G	0	100	0
PP-005+OC	.188+.25G	0	100	0
DPX-Y6202+OC	.1+.25G	0	100	0
Haloxyfop+OC	.1+.25G	0	100	0
Desm/Desm+Sethox+OC	.5/.5+.2+.25G	8	100	100
Desm/Desm+PP-005+OC	.5/.5+.188+.25G	6	100	100
Desm/Desm+DPX-Y6202+OC	.5/.5+.1+.25G	9	100	100
Desm/Desm+Haloxyfop+OC	.5/.5+.1+.25G	4	100	100

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Treatment*	Rate (lb/A)	June 27 Sugarbeet injury rating	----- July 9 ----- Gr & Ye Foxtail control rating	Redroot Pigweed control rating
		---------------	(%)	--------------
Mean		9	96	80
High mean		24	100	100
Low mean		0	61	0
Coeff. of variation		62	6	4
LSD(1 Percent)		10	11	6
LSD(5 Percent)		8	8	5
No. of reps		4	4	4

* OC = ATplus 411F

Summary

Desmedipham+phenmedipham applied twice at 0.5 lb/A gave less redroot pigweed control than desmedipham applied twice at 0.5 lb/A. Desmedipham applied once at 1 lb/A gave less redroot pigweed control than desmedipham applied twice at 0.5 lb/A. All treatments including EPTC, ethofumesate, diethatyl, DPX-Y6202, haloxyfop, dalapon, sethoxydim, and PP-005 gave excellent control of green and yellow foxtail.

Preplant incorporated and postemergence herbicides, Hillsboro, 1984. Preplant incorporated herbicides were applied and rototiller incorporated May 11 when the air temp.=60F, soil temp. at six inches=48F, wind was NW at 30 mph, and soil surface was moist. The rototiller was operated four inches deep to incorporate EPTC and two inches deep for incorporation of ethofumesate. Beta 1230 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 11. The first split of split application postemergence treatments was applied 1:30 pm June 23 (air temp.=79F, soil temp. at six inches=69F, relative humidity=32%, wind NW 15-20 mph) when sugarbeets were 2-4 leaf, redroot pigweed were cotyledon to 2 leaf, and yellow foxtail was just emerging to 4 inches tall. The second split of split application treatments and all single application treatments were applied 10:30-1:30 pm June 29 (air temp.=83F, soil temp. at six inches=75F, soil moisture in top four inches=18.5%, wind was south 2-8 mph, relative humidity=37%, sunny sky) when sugarbeets were 4-6 leaf, redroot pigweed was 2-4 leaf, and yellow foxtail was 4-5 leaf. Treatments with three postemergence applications had the third split applied 1:30 pm July 5 when the air temp.=72F and the wind was NW at 15-20 mph. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Redroot pigweed and yellow foxtail control and sugarbeet injury were evaluated July 13.

		----------- July 13 -----------		
Treatment*	Rate (lb/A)	Redroot Pigweed control rating	Yellow Foxtail control rating	Sugarbeet injury rating
		------------- (%) -------------		
EPTC/Desmedipham&Phenmedipham 2X	3/.5	92	90	20
EPTC/De&Ph/De&Ph+Dalapon 2X	3/.5/.5+1	100	99	48
EPTC/De&Ph/D&P+Etho 2X	3/.5/.375+.75	100	99	51
Etho PPI/Desmed&Phenmed 2X	3.75/.5	100	94	3
Etho PPI/D&P/D&P+Dala 2X	3.75/.5/.5+1	100	99	9
Eth PPI/DP/DP+Eth 2X	3.75/.5/.375+.75	100	100	6
Desmedipham 2X	.5	96	30	0
Desmedipham&Phenmedipham 2X	.5	89	55	3
Desmedipham&Phenmedipham	1	80	5	0
Des&Phen 2X/Des&Phen+Dalapon	.5/1+2	99	87	23
Des&Phen/Des&Phen+Dalapon 2X	.5/.5+1	100	83	9
Des&Phen 2X/Des&Phen+Etho	.5/.75+1.5	100	83	20
Des&Phen/Des&Phen+Etho 2X	.5/.375+.75	100	79	9
Sethoxydim+OC	.2+.25G	0	100	0
Des&Phen+Sethoxydim+OC	1+.2+.25G	65	93	0
Des&Phen+Sethoxydim 2X	.5+.1	84	88	0
Des&Phen+Sethoxydim+OC 2X	.5+.1+.125G	85	93	8
De&Ph/De&Ph+Sethox+OC	.5/.5+.2+.25G	90	90	0
Desmed&Phenmed+Dalapon 2X	.5+1	92	79	8
Des&Phen+Ethofumesate 2X	.375+.75	99	46	3
D&P+Etho+Seth+OC 2X	.375+.75+.1+.125G	97	96	4
De&Ph+Seth 2X/De&Ph+Dalapon	.5+.1/1+2	100	99	24
D&P+Seth 2X/D&P+Etho	.5+.1/.75+1.5	100	95	26

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Treatment*	Rate (lb/A)	Redroot Pigweed control rating	Yellow Foxtail control rating	Sugarbeet injury rating
		----------- July 13 -----------		
		-------------- (%) --------------		
Benazolin	.125	20	0	0
Benazolin	.25	45	0	3
Benazolin	.5	56	0	4
Desmed&Phenmed+Benazolin	1+.125	88	8	0
Desmed&Phenmed+Benazolin	1+.25	90	15	5
Desmed&Phenmed+Benazolin 2X	.5+.06	96	53	3
Desmed&Phenmed+Benazolin 2X	.5+.125	98	50	10
D&P+Benazolin+Seth+OC	1+.125+.2+.25G	76	93	5
D&P+Benazolin+Seth+OC	1+.25+.2+.25G	68	90	10
Mean		84	68	10
High mean		100	100	51
Low mean		0	0	0
Coeff. of variation		11	12	108
LSD(1 Percent)		18	16	19
LSD(5 Percent)		13	12	15
No. of reps		4	4	4

* OC = ATplus 411F

Summary

EPTC plus postemergence herbicides caused more sugarbeet injury than ethofumesate plus postemergence herbicides or postemergence herbicides alone. Benazolin gave poor redroot pigweed control even at 0.5 lb/A. All treatments that included sethoxydim gave 88% or greater control of yellow foxtail.

Herbicides applied preemergence seven days after planting, Fargo, 1984. Maribo Ultramono sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 16. Herbicides were applied in 17 gpa water at 40 psi to four row plots on May 23 when the air temp.=50F, soil temp. at six inches=50F, soil moisture was dry, and wind was west 10-12 mph. Sugarbeets were counted in 60 feet of row from each treated plot and in 60 feet of row from the untreated check plots to determine sugarbeet stand on June 1.

Treatment	Rate (lb/A)	June 1 Sugarbeet stand counts beets/60 ft.
Glyphosate	.25	43
Glyphosate	1	35
Glyphosate	4	37
Untreated Check	.	40
2,4-D	.5	41
2,4-D	1	52
Bromoxynil	.25	33
Bromoxynil	.5	39
Mean		40
High mean		52
Low mean		33
Coeff. of variation		35
LSD(1 Percent)		22
LSD(5 Percent)		17
No. of reps		6

Summary

None of the treatments affected sugarbeet stands. Soil was much drier than with the same experiment at Glyndon.

Herbicides applied preemergence seven days after planting, Glyndon, 1984. GW Mono-Hy R1 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 2. Herbicides were applied in 17 gpa water a 40 psi to the center four rows of six row plots 1:00 pm May 9 when the air temp.=57F, soil temp. at six inches= 44F, soil moisture was good, and wind was NE at 3 mph. Sugarbeets were counted in 60 feet of row from each treated plot and in 60 feet of row from the untreated check plots to determine sugarbeet stand on June 1.

Treatment	Rate (lb/A)	June 1 Sugarbeet stand counts beets/60 ft.
Glyphosate	.25	88
Glyphosate	1	75
Glyphosate	4	99
Untreated Check	.	110
2,4-D	.5	85
2,4-D	1	94
Bromoxynil	.25	81
Bromoxynil	.5	91
Mean		90
High mean		110
Low mean		75
Coeff. of variation		19
LSD(1 Percent)		35
LSD(5 Percent)		26
No. of reps		4

Summary

Glyphosate at 1 lb/A and bromoxynil at 0.25 lb/A caused significant reductions in sugarbeet stands. Soil moisture was much better than with the same experiment at Fargo.

Postemergence herbicides, Crookston, 1984. Bush Johnson 19 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 10. The first half of split application treatments were applied 11:30 pm June 15 (soil wet & muddy with abundant subsoil moisture, partly cloudy, air temp.=79F, soil temp. at six inches=63F, relative humidity=72%, wind SW 10-15 mph) when sugarbeets were at four leaf stage, redroot pigweed was 2-4 leaf, green foxtail was just emerging to 2 inches tall, common lambsquarters was 2-3 inches tall, and kochia was 1-4 inches tall. The second half of split applied treatments and all single application treatments were applied 11:00 am - 3:30 pm June 22 (air temp.=80F, soil temp. at six inches=68F, relative humidity=76%, wind was south 10-15 mph) when sugarbeets were at the 6-10 leaf stage, redroot pigweed was 1-3 inches tall, green foxtail was 1-4 inches tall, common lambsquarters was 6-10 inches tall, and kochia was 3-8 inches tall. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Redroot pigweed, kochia, common lambsquarter, and green foxtail control and sugarbeet injury were evaluated July 20.

		July 20				
Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Grft cntl ratg (%)	Colq cntl ratg	Kocz cntl ratg
Sethoxydim+OC	.2+.25G	0	0	100	0	0
Sethoxydim+OC	.3+.25G	0	0	100	0	0
PP-005+OC	.094+.25G	0	0	89	0	0
PP-005+OC	.125+.25G	0	0	97	0	0
PP-005+OC	.188+.25G	0	0	98	0	0
PP-005+OC	.25+.25G	0	0	100	0	0
Haloxyfop+OC	.075+.25G	0	0	100	0	0
Haloxyfop+OC	.1+.25G	0	0	100	0	0
DPX-Y6202+OC	.075+.25G	0	0	100	0	0
DPX-Y6202+OC	.1+.25G	0	0	100	0	0
Clopropoxydim+OC	.1+.25G	0	0	98	0	0
Clopropoxydim+OC	.2+.25G	0	0	100	0	0
HOE-33171+OC	.15+.25G	0	0	99	0	0
HOE-33171+OC	.2+.25G	0	0	100	0	0
Sethoxydim+PP-005+OC	.1+.1+.25G	0	0	100	0	0
Desmedipham	1	0	95	50	98	80
Desmedipham 2X	.5	0	96	71	100	84
Desmedipham+OC 2X	.5+.125G	0	98	81	100	85
Desmedipham+Dalapon 2X	.5+1	0	98	99	100	88
Desm+Eth+Seth+OC 2X	.375+.75+.1+.125G	0	100	100	100	91
Desmedipham+Ethofumesate 2X	.375+.75	0	100	91	100	91
Desm/Desm+Sethox+OC	.5/.5+.2+.25G	0	94	98	100	83
Desm/Desm+Sethox+OC	.5/.5+.3+.25G	0	95	93	100	79
Desm/Desm+PP-005+OC	.5/.5+.125+.25G	0	98	97	100	80
Desm/Desm+PP-005+OC	.5/.5+.188+.25G	0	95	96	100	79
Desm/Desm+PP-005+OC	.5/.5+.25+.25G	0	98	97	100	75
Des/Des+Haloxyfop+OC	.5/.5+.075+.25G	0	97	95	100	75
Des/Des+Haloxyfop+OC	.5/.5+.1+.25G	0	98	96	100	75
Des/Des+DPX-Y6202+OC	.5/.5+.075+.25G	0	95	95	100	79
Des/Des+DPX-Y6202+OC	.5/.5+.1+.25G	0	98	96	100	75

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Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Grft cntl ratg	Colq cntl ratg	Kocz cntl ratg
		July 20 (%)				
Des/Des+Clopropoxydim+OC	.5/.5+.1+.25G	0	93	94	99	63
Des/Des+Clopropoxydim+OC	.5/.5+.2+.25G	0	95	97	99	80
Des/Des+HOE-33171+OC	.5/.5+.15+.25G	0	96	97	100	60
Des/Des+HOE-33171+OC	.5/.5+.2+.25G	0	95	96	100	78
Desmedipham+Sethoxydim+OC	1+.2+.25G	0	91	97	99	71
Desmedipham+PP-005+OC	1+.125+.25G	0	93	93	100	64
Desmedipham+Haloxyfop+OC	1+.1+.25G	0	94	96	99	54
Desmedipham+DPX-Y6202+OC	1+.1+.25G	0	95	93	100	57
Desmedipham+Clopropoxydim+OC	1+.2+.25G	0	94	95	99	79
Desmedipham+HOE-33171+OC	1+.15+.25G	0	93	97	96	69
Desmedipham+Sethoxydim 2X	.5+.1	0	98	99	100	75
Desmedipham+PP-005 2X	.5+.094	0	95	95	100	73
Desmedipham+Haloxyfop 2X	.5+.05	0	98	99	100	68
Desmedipham+DPX-Y6202 2X	.5+.05	0	97	95	100	61
Desmedipham+Clopropoxydim 2X	.5+.1	0	96	99	100	63
Desmedipham+HOE-33171 2X	.5+.075	0	88	97	99	53
Table . Continued						
Mean		0	64	95	67	50
High mean		0	100	100	100	91
Low mean		0	0	50	0	0
Coeff. of variation		0	5	6	2	23
LSD(1 Percent)		0	6	10	2	20.
LSD(5 Percent)		0	5	7	2	16
No. of reps		4	4	4	4	4

* OC = ATplus 411F

Summary

PP-005 at 0.094 lb/A gave less control of green foxtail than the higher rates of PP-005 and less control than all tested rates of the other postemergence grass herbicides. Desmedipham did not reduce green foxtail control from the postemergence grass herbicides when used in combination. However, desmedipham alone gave from 50% to 71% green foxtail control and this unusually high control probably masked any antagonism. All treatments that included desmedipham gave good to excellent control of redroot pigweed and common lambsquarters. None of the treatments gave excellent kochia control. Split applications of desmedipham+ethofumesate gave the highest kochia control (91%) but several other treatments were statistically similar.

Grass herbicides on wild oats, Fargo (NW section 22), 1984. GW MonoHy R1 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 17. All single application treatments and "Day 1" of split applied treatments were applied 12:30 pm June 20 (air temp.=78F, soil temp. at six inches=66F, soil moisture in top four inches=22%, wind was east at 10 mph, relative humidity=67%, partly cloudy) when wild oats was 2-12 inches tall. "Day 2" treatments were applied 4:00 pm June 21 when the air temp.=80F, soil temp. at six inches=66F, wind was SE 10-15 mph, relative humidity=68%, and mostly sunny. "Day 3" treatments were applied 8:30 am June 22 when the air temp.=72F, wind was south at 5 mph, and relative humidity=77%. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Wild oats control was evaluated July 21.

Treatment*	Rate (lb/A)	July 21 Wild Oats control rating ---(%)---
Sethoxydim+OC	.2+.25G	99
Sethoxydim+OC	.25+.25G	100
Sethoxydim+OC	.3+.25G	100
PP-005+OC	.094+.25G	99
PP-005+OC	.125+.25G	100
PP-005+OC	.188+.25G	100
PP-005+OC	.25+.25G	100
Haloxyfop+OC	.075+.25G	100
Haloxyfop+OC	.1+.25G	100
DPX-Y6202+OC	.075+.25G	99
DPX-Y6202+OC	.1+.25G	100
Clopropoxydim+OC	.1+.25G	100
Clopropoxydim+OC	.2+.25G	100
HOE-33171+OC	.15+.25G	95
HOE-33171+OC	.2+.25G	96
Sethoxydim+PP-005+OC	.1+.1+.25G	100
Desmedipham	1	3
Desm+Sethox+OC (D1)	1+.2+.25G	66
Desm+PP-005+OC (D1)	1+.125+.25G	95
Desm (D1)/Sethox+OC (D2)	1/.2+.25G	78
Desm (D1)/PP-005+OC (D2)	1/.125+.25G	92
Desm (D1)/Sethox+OC (D3)	1/.2+.25G	56
Desm (D1)/PP-005+OC (D3)	1/.125+.25G	84
Seth+OC (D1)/Des (D1+2hr)	.2+.25G/1	72
PP-5+OC (D1)/Des (D1+2hr)	.125+.25G/1	95
Sethox+OC (D1)/Desm (D3)	.2+.25G/1	96
PP-005+OC (D1)/Desm (D3)	.125+.25G/1	98

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Treatment*	Rate (lb/A)	July 21 Wild Oats control rating ---(%)---
Mean		90
High mean		100
Low mean		3
Coeff. of variation		5
LSD(1 Percent)		9
LSD(5 Percent)		7
No. of reps		4

* OC = ATplus 411F

Summary

All the postemergence grass herbicides used alone gave excellent control of wild oats. Tank mixing desmedipham with sethoxydim and applying on June 20 (D1) resulted in less wild oat control than from sethoxydim alone. Applying desmedipham first and sethoxydim 48 hours later did not reduce the antagonism. Applying sethoxydim first and desmedipham 48 hours later gave similar control to sethoxydim alone. PP-005 was affected less by desmedipham than sethoxydim.

Quackgrass control with postemergence herbicides, Crookston, 1983. Herbicides were aplied in 17 gpa water at 40 psi to four row plots 30 feet long in a commercial sugarbeet field that was planted April 25, 1983 with Beta 1230 sugarbeet seed. Single applications and the first half of split application treatments were applied 11:45 am May 27 (air temp.=73F, six inch soil temp.=62F, relative humidity=43%, wind was east at 5 mph, soil moisture in top 4 inches of soil=16%) when sugarbeets were at the 2 leaf stage and quackgrass was 3-9 inches tall. The second half of the split application treatments were applied 3 weeks later at 12:45 pm on June 17 (air temp.=72F, six inch soil temp.=65F, relative humidity=46%, wind south 10-15 mph) when sugarbeets were 6-8 leaf and quackgrass was 12-18 inches tall in untreated plots. Quackgrass control was evaluated July 5, 1983 and again June 22, 1984.

Treatment*	Quackgrass size (inches)	Rate (lb/A)	July 5, 1983 Quackgrass control rating (%)	June 22,1984 Quackgrass control rating (%)
Sethoxydim+OC	(3-9 in)	.2+.25G	31	30
Sethoxydim+OC	(3-9 in)	.4+.25G	64	47
Sethoxydim+OC	(3-9in/12-18in)	.4+.25G/.2+.25G	86	62
Fluazifop+OC	(3-9 in)	.25+.25G	63	47
Fluazifop+OC	(3-9 in)	.5+.25G	85	57
Fluazifop+OC	(3-9in/12-18in)	.25+.25G/.25+.25G	100	63
Haloxyfop+OC	(3-9 in)	.1+.25G	78	80
Haloxyfop+OC	(3-9 in)	.2+.25G	93	78
Haloxyfop+OC	(3-9in/12-18in)	.2+.25G/.1+.25G	100	92
DPX-Y6202+OC	(3-9 in)	.1+.25G	86	73
DPX-Y6202+OC	(3-9 in)	.2+.25G	88	80
DPX-Y6202+OC	(3-9in/12-18in)	.2+.25G/.1+.25G	100	92
Untreated Check			0	0
Mean			75	62
High mean			100	92
Low mean			0	0
Coeff. of variation			14	13
LSD(1 Percent)			20	18
LSD(5 Percent)			15	13
No. of reps			4	3

* OC = ATplus 411F

Summary

Two 1983 applications of fluazifop, haloxyfop, and DPX-Y6202 gave 100% control of quackgrass on July 5, 1983. Quackgrass control was still 92% on June 22, 1984 from two 1983 applications of haloxyfop and DPX-Y6202 but control had fallen to 63% from two 1983 applications of fluazifop. Fluazifop at 0.25 lb/A gave quackgrass control in 1983 and 1984 similar to sethoxydim at 0.4 lb/A. Haloxyfop at 0.1 lb/A and DPX-Y6202 at 0.1 lb/A gave 1983 quackgrass control similar to fluazifop at 0.5 lb/A. All rates of haloxyfop and DPX-Y6202 gave better 1984 quackgrass control than sethoxydim and fluazifop.

Quackgrass control with postemergence herbicides, Crookston, 1984. The plot site was located in a commercial corn field with high densities of quackgrass. Herbicides were applied in 17 gpa water at 40 psi to plots 30 feet long and 10 feet wide. All single application treatments and the first half of split application treatments were applied 11:00 am June 23 (air temp.=66F, soil temp. at six inches=65F, NW wind 15-20 mph, mostly sunny) when quackgrass and wild oat were 12-18 inches tall and corn was 15 inches tall. The second half of split application treatments was applied 12:30 pm July 5 when the air temp.= 68F and the wind was north at 15 mph. Corn, quackgrass, late emerging foxtail and wild oat control were evaluated July 27.

		July 27			
Treatment*	Rate (lb/A)	Volunteer Corn cntl ratg	Quackgrass cntl ratg	Late Emerging Yeft cntl ratg	Wioa cntl ratg
		(%)			
PP-005+OC	.125+.25G	100	70	25	89
PP-005+OC	.25+.25G	100	98	35	100
PP-005+OC	.375+.25G	100	100	73	100
PP-005+OC 2X	.125+.25G	100	97	66	100
PP-005+OC 2X	.063+.25G	100	90	73	98
Sethoxydim+OC	.4+.25G	100	53	71	98
Haloxyfop+OC	.2+.25G	100	100	69	100
Haloxyfop+OC 2X	.1+.25G	100	100	76	100
Halox+OC/Halox+OC	.2+.25G/.1+.25G	100	100	89	100
DPX-Y6202+OC	.2+.25G	100	96	55	99
DPX-Y6202+OC 2X	.1+.25G	100	100	85	97
DPX-Y6+OC/DPX-Y6+OC	.2+.25G/.1+.25G	100	100	88	99
Clopropoxydim+OC	.2+.25G	100	82	75	100
Clopropoxydim+OC	.4+.25G	100	92	80	100
Clopropoxydim+OC 2X	.2+.25G	100	94	94	100
Clopr+OC/Clopr+OC	.4+.25G/.2+.25G	100	99	88	100
Untreated Check		0	0	0	0
Mean		94	86	67	93
High mean		100	100	94	100
Low mean		0	0	0	0
Coeff. of variation		0	8	17	2
LSD(1 Percent)		0	13	21	4
LSD(5 Percent)		0	10	16	3
No. of reps		4	4	4	4

* OC = ATplus 411F

Summary

Yellow foxtail emerged after herbicide application so control is an estimate of soil residual activity. PP-005 at 0.125 and 0.25 lb/A gave less control of yellow foxtail than all other treatments. PP-005 at 0.125 lb/A gave less wild oat control than all other treatments. Sethoxydim at 0.4 lb/A gave less quackgrass control than all other treatments. Two applications of PP-005 at 0.063 lb/A gave better quackgrass control than a single application at 0.125 lb/A.

Effect of spray volume on postemergence grass herbicides, Fargo (NW sect. 22), 1984. GW MonoHy R1 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 17. Herbicides were applied in 8.5, 17, and 25 gpa water using 8001, 8002, and 8003 nozzles, respectively at 40 psi to the center four rows of six row plots 3:30 pm June 20 (air temp.=78F, soil temp. at six inches=66F, soil moisture in top four inches=22%, relative humidity=67%, wind was east at 10 mph, partly cloudy) when wild oats was 2-12 inches tall. Wild oats control was evaluated July 21.

Treatment*	Spray Volume (gpa)	Rate (lb/A)	July 21 Wild Oats control rating ---(%)---
Sethoxydim+OC	8.5	.1+.25G	99
Sethoxydim+OC	17	.1+.25G	93
Sethoxydim+OC	25	.1+.25G	82
PP-005+OC	8.5	.094+.25G	100
PP-005+OC	17	.094+.25G	99
PP-005+OC	25	.094+.25G	97
Desm+Sethoxydim+OC	8.5	1+.1+.25G	61
Desm+Sethoxydim+OC	17	1+.1+.25G	36
Desm+Sethoxydim+OC	25	1+.1+.25G	31
Desm+PP-005+OC	8.5	1+.094+.25G	89
Desm+PP-005+OC	17	1+.094+.25G	81
Desm+PP-005+OC	25	1+.094+.25G	80
Mean			79
High mean			100
Low mean			31
Coeff. of variation			8
LSD(1 Percent)			11
LSD(5 Percent)			9
No. of reps			4

* OC = ATplus 411F

Summary

Wild oat control from sethoxydim and PP-005 was or tended to be reduced by increasing spray volume.

Influence of spray volume on grass herbicides, Crookston, 1984. Bush Johnson 19 sugarbeet seed was planted 1.25 inches deep in 22 inch rows on May 10. Herbicides were applied in 8.5, 17, and 25 gpa water using 8001, 8002, and 8003 nozzles, respectively at 40 psi to the center four rows of six row plots 3:30 pm June 22 (air temp.=80F, soil temp. at six inches=68F, relative humidity=76%, wind was south at 10 mph) when sugarbeets were 6-10 leaf, common lambsquarters were 2-10 inches tall, wild mustard was flowering, wild oat was in the early boot stage (12-18 inches tall), and green foxtail was 1-4 inches tall. Wild oat, green foxtail, wild mustard, and common lambsquarters control and sugarbeet injury were evaluated July 10.

			----	----	July 10	----	----
Treatment*	Spray Volume (gpa)	Rate (lb/A)	Sgbt inj ratg	Colq cntl ratg	Wimu cntl ratg	Wioa cntl ratg	Grft cntl ratg
					(%)		
Sethoxydim+OC	8.5	.1+.25G	0	0	0	92	93
Sethoxydim+OC	17	.1+.25G	0	0	0	84	93
Sethoxydim+OC	25	.1+.25G	0	0	0	33	81
PP-005+OC	8.5	.094+.25G	0	0	0	97	79
PP-005+OC	17	.094+.25G	0	0	0	91	81
PP-005+OC	25	.094+.25G	0	0	0	87	71
Desm+Sethox+OC	17	1+.1+.25G	0	70	96	58	87
Desm+Sethox+OC	25	1+.1+.25G	0	52	90	43	74
Desm+PP-005+OC	8.5	1+.094+.25G	0	75	92	89	69
Desm+PP-005+OC	17	1+.094+.25G	0	63	94	80	71
Desm+PP-005+OC	25	1+.094+.25G	0	48	82	61	55
DPX-Y6202+OC	8.5	.075+.25G	0	0	0	92	97
DPX-Y6202+OC	17	.075+.25G	0	0	0	95	97
DPX-Y6202+OC	25	.075+.25G	0	0	0	88	92
Des+DPX-Y6202+OC	8.5	1+.075+.25G	0	62	91	71	90
Des+DPX-Y6202+OC	17	1+.075+.25G	0	70	100	55	89
Des+DPX-Y6202+OC	25	1+.075+.25G	0	58	93	58	78
Mean			0	29	43	75	82
High mean			0	75	100	97	97
Low mean			0	0	0	33	55
Coeff. of variation			0	28	9	13	15
LSD(1 Percent)			0	18	7	18	23
LSD(5 Percent)			0	14	5	14	17
No. of reps			4	3	4	4	4

* OC = ATplus 411F

Summary

Wild oat control and green foxtail control from sethoxydim and PP-005 was or tended to be reduced by increasing spray volume.

Influence of barban and dalapon on other grass herbicides, Glyndon, 1984. GW Mono-Hy R1 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 2. All single application herbicide treatments and the first half of split application treatments were applied 2:00 pm June 27 (air temp.=80F, soil temp. at six inches=75F, relative humidity=41%, soil moisture in top four inches=18%, wind N 5-8 mph, sunny) when the first flush of common lambsquarters were 12 inches tall, second flush of common lambsquarters were 3 inches tall, first flush of green foxtail were 8-10 inches tall, and second flush of green foxtail were 3 inches tall. The second half of split application treatments was applied 12:30 pm July 3 when the air temp.=83F, wind was NW 5-7 mph, and sky was sunny and clear. Common lambsquarters control and green foxtail control were evaluated July 23.

Treatment*	Rate (lb/A)	July 23: Common Lambsquarters control rating (%)	July 23: Green Foxtail control rating (%)
Barban	1	0	3
Dalapon	2	0	96
Sethoxydim+OC	.2+.25G	0	100
PP-005+OC	.125+.25G	0	83
Barban/Sethoxydim+OC	1/.2+.25G	0	100
Dalapon/PP-005+OC	2/.125+.25G	0	96
Desmedipham+Dalapon	1+2	83	99
Des+Dalapon/Sethoxydim+OC	1+2/.2+.25G	85	100
Barban/PP-005+OC	1/.125+.25G	0	80
Dalapon/Sethoxydim+OC	2/.2+.25G	0	99
Desm+Dalapon/PP-005+OC	1+2/.125+.25G	88	100
Mean		23	87
High mean		88	100
Low mean		0	3
Coeff. of variation		11	6
LSD(1 Percent)		5	9
LSD(5 Percent)		4	7
No. of reps		4	4

* OC = ATplus 411F

Summary

Prior treatment with barban or dalapon did not reduce green foxtail control from sethoxydim or PP-005. Dalapon followed by PP-005 gave greater control of green foxtail than from PP-005 alone. PP-005 at 0.125 lb/A gave less green foxtail control than sethoxydim at 0.2 lb/A.

Herbicide combinations with trifluralin and ethalfluralin, Glyndon, 1984. GW Mono-Hy R1 sugarbeet seed was planted 1.25 inches deep in 22 inch rows on May 2. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots 2:00 pm June 27 (air temp.=80F, soil temp. at six inches=75F, soil moisture in top four inches=17.5%, relative humidity=41%, wind N 5-8 mph, sunny) when the first flush of common lambsquarters were 12 inches tall, second flush of common lambsquarters were 3 inches tall, first flush of green foxtail were 8-10 inches tall, and second flush of green foxtail were 3 inches tall. Common lambsquarters control and green foxtail control were evaluated July 23.

		--------- July 23 ---------	
Treatment*	Rate (lb/A)	Common Lambsquarters control rating	Green Foxtail control rating
		----------- (%) -----------	
Desmedipham+Sethoxydim+OC	1+.2+.25G	88	89
Desmedipham	1	79	11
Sethoxydim+OC	.2+.25G	0	100
PP-005+OC	.125+.25G	0	70
Desmedipham+Trifluralin	1+.75	81	23
Sethoxydim+Trifluralin+OC	.2+.75+.25G	0	100
PP-005+Trifluralin+OC	.125+.75+.25G	0	61
Desmedipham+Ethalfluralin	1+.75	85	15
Sethox+Ethalfluralin+OC	.2+.75+.25G	0	98
PP-005+Ethalfluralin+OC	.125+.75+.25G	0	70
Desm+Sethox+Triflur+OC	1+.2+.75+.25G	88	89
Desm+Sethox+Ethalfl+OC	1+.2+.75+.25G	86	89
Mean		42	68
High mean		88	100
Low mean		0	11
Coeff. of variation		9	18
LSD(1 Percent)		7	23
LSD(5 Percent)		5	17
No. of reps		4	4

* OC = ATplus 411F

Summary

Trifluralin and ethalfluralin had no influence on weed control from PP-005, sethoxydim, desmedipham, or desmedipham + sethoxydim when comparing tank-mix combinations to the postemergence herbicides alone. Desmedipham + sethoxydim tended to give less green foxtail control than sethoxydim alone.

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Herbicides and growth regulators on weedfree sugarbeets, Fargo, 1984. All treatments were applied in 17 gpa water at 40 psi to four row plots. Preplant incorporated herbicides were applied and rototiller incorporated May 16 when the air temp.=83F, soil temp. at six inches=55F, and the wind was SE at 25-30 mph. The rototiller was set four inches deep for EPTC treatments and two inches deep for all other PPI treatments. Maribo Ultramono sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 16. Single application postemergence herbicide treatments and the first split of multiple application postemergence treatments were applied between 9:00 am and 12:15 pm June 27 (air temp.=79F, soil temp. at six inches=67F, rel. humid.=38%, wind NW 7-10 mph) when sugarbeets had 6-8 leaves. The second postemergence split of multiple application treatments was applied 9:30 am July 3 when the air temp. = 75F and and wind = 0 mph. The third postemergence split was applied 5:00 pm July 9 when the air temp.=85F and wind was north at 5 mph. The fourth postemergence split of multiple application treatments was applied 8:30 am July 16 when the air temp.=68F, wind was north 5-8 mph, and the sky was overcast. July 17 application of PP-005 was at 9:30 am when the air temp.=67F, rel. humid.=32%, soil temp. at six inches=70F, wind=west at 5-8 mph, and sunny skies. August 2 application of PP-005 was at 1:30 pm when the air temp.=88F, soil temp. at six inches=77F, rel. humid.=49%, and wind was north at 8-12 mph. AC-239-134F was applied 2:00 pm September 5 when the air temp.=67F, soil moisture was very dry and the wind was south 10-12 mph with a sunny sky. Sugarbeets were hand thinned June 20, cultivated July 5, and hand weeded throughout the growing season. Sugarbeets were harvested from the center two rows of each plot for a total of 52 feet of row harvested per plot on October 2.

Treatment*	Rate (lb/A)	Sucro (%)	Root Yield ton/A	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popl 52ft
Untreated Check	.	16.1	10.6	1280	2.8	2746	41
Haloxyfop+OC	.2+.25G	16.4	10.8	1204	2.7	2899	44
Haloxyfop+OC	.4+.25G	16.1	11.8	1323	2.9	3049	43
DPX-Y6202+OC	.2+.25G	16.2	11.8	1355	3.0	3021	43
DPX-Y6202+OC	.4+.25G	15.9	11.5	1326	2.9	2937	42
PP-005+OC	.25+.25G	16.1	12.5	1302	2.9	3231	43
PP-005+OC	.5+.25G	15.7	12.3	1318	2.8	3085	48
PP-005+OC	.75+.25G	15.5	11.4	1369	2.9	2786	47
Sethoxydim+OC	.4+.25G	15.3	12.4	1341	2.8	3024	45
Sethoxydim+OC	.6+.25G	15.6	10.6	1371	2.9	2616	42
Clopropoxydim+OC	.2+.25G	16.0	12.1	1274	2.8	3108	42
Clopropoxydim+OC	.4+.25G	16.3	11.4	1223	2.7	3027	43
PP-005+OC June 27 & Aug. 2	.375+.25G	16.2	11.9	1243	2.7	3140	41
PP-005+OC June 27 & July 17	.375+.25G	15.9	10.3	1371	2.9	2605	44
HOE-33171+OC	.4+.25G	16.1	11.0	1273	2.8	2870	36
HOE-33171+OC	.6+.25G	16.0	11.8	1329	2.9	3028	38
Dowco-290	.125	16.0	12.0	1212	2.6	3144	44
Dowco-290	.19	16.3	11.2	1307	2.9	2950	42
Dowco-290	.25	15.9	10.5	1398	3.0	2619	41

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Treatment*	Rate (lb/A)	Sucro (%)	Root Yield ton/A	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popl 52ft
AC-239-234F September 5	1	15.8	11.7	1283	2.8	2992	41
Benazolin	.125	15.9	10.5	1247	2.7	2700	43
Benazolin	.25	15.3	10.4	1369	2.9	2541	37
Benazolin	.5	15.2	8.1	1437	2.9	1934	34
Acifluorfen (PPI)	.25	15.1	7.9	1474	3.0	1862	18
Acifluorfen (PPI)	.37	14.6	5.9	1522	3.0	1332	13
Acifluorfen (PPI)	.5	14.9	7.2	1444	2.9	1706	15
Methazole (PPI)	2	15.5	10.9	1300	2.8	2714	40
Methazole (PPI)	4	15.6	9.5	1266	2.7	2398	36
Methazole	1	14.4	3.4	1437	2.8	767	7
Methazole	2	14.8	1.4	1303	2.7	323	3
Desmedipham	1	15.7	14.8	1329	2.8	3698	52
Desm/Desm/Desm+Dalapon	.75/.75/1+2	16.1	10.2	1369	3.0	2615	43
Desmedipham 2X	.75	16.3	12.2	1297	2.9	3192	43
Desmedipham+Dalapon	1+2	15.5	12.2	1355	2.9	3023	38
EPTC (PPI)	3	15.9	10.2	1259	2.7	2602	35
EPTC PPI/De/De/De+Dala	3/.75/.75/1+2	15.3	8.5	1405	2.9	2064	38
Desmedipham 4X	.75	16.2	11.4	1280	2.8	2979	45
Desmedipham 4X	.5	16.0	12.7	1271	2.8	3289	47
Untreated Check	.	16.1	11.8	1342	2.9	3025	45
Mean		15.7	10.5	1326	2.8	2671	38
High mean		16.4	14.8	1522	3.0	3698	52
Low mean		14.4	1.4	1204	2.6	323	3
Coeff. of variation		4.7	20.9	11	9.1	19	19
LSD(1 Percent)		1.1	3.3	215	0.4	773	10
LSD(5 Percent)		0.8	2.5	164	0.3	588	8
No. of reps		6.0	6.0	6	6.0	6	6

* OC = ATplus 411F

Summary

Postemergence benazolin at 0.5 lb/A, preplant incorporated acifluorfen, and postemergence methazole reduced sugarbeet populations and extractable sucrose compared to the average of the two untreated checks. PPI EPTC at 3 lb/A + post desmedipham at 0.75 lb/A + post desmedipham at 0.75 lb/A + post desmedipham + dalapon at 1+2 lb/A reduced extractable sucrose compared to the average of the two untreated checks.

Preplant incorporated herbicides plus starter fertilizer applied at planting, Glyndon, 1984. Herbicides were applied in 17 gpa water at 40 psi to four row plots and rototiller incorporated May 1 when the air temp.=51F, soil temp. at six inches=40F, soil moisture in the top four inches of soil=15.5%, and wind was NW 5-10 mph. The rototiller was operated four inches deep for treatments containing EPTC or cycloate and two inches deep for diethatyl alone. ACH-164 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 1. Liquid fertilizer (10-34-0) was metered into the same furrow as the sugarbeet seed during planting. Three rates of starter fertilizer were applied to each herbicide treatment and to a control treatment that did not have herbicide applied. Sugarbeet injury was evaluated May 28. Sugarbeets were counted May 29 in 60 feet of row from the center two rows of each treated plot and in 60 feet of row from the center two rows of each untreated check plot to determine sugarbeet stand reduction. Sugarbeets were hand thinned June 22, cultivated July 9, and kept weed free by hand weeding throughout the growing season. Sugarbeets were harvested in 60 feet of row from the center two rows of each plot October 3.

Herbicide Treatment	Fertilizer Treatment	Herbicide Rate (lb/A)	May 29 Sugarbeet Stand Count 60 feet	May 28 Percent Sugarbeet Injury Rating	May 29 Percent Sugarbeet Stand Reduction
Diethatyl		7	288	8	-27
Diethatyl	(3.33 gal/A)	7	271	10	-21
Diethatyl	(6.66 gal/A)	7	249	13	-9
Diethatyl	(10 gal/A)	7	215	23	7
Control	(3.33 gal/A)	0	282	0	-23
Control	(6.66 gal/A)	0	266	5	-16
Control	(10 gal/A)	0	227	15	1
Diethatyl+Cycloate		5+3	247	24	-8
Diethatyl+Cycloate	(3.33 gal/A)	5+3	255	19	-14
Diethatyl+Cycloate	(6.66 gal/A)	5+3	229	23	-1
Diethatyl+Cycloate	(10 gal/A)	5+3	185	34	19
EPTC		2.5	265	20	-18
EPTC	(3.33 gal/A)	2.5	263	16	-17
EPTC	(6.66 gal/A)	2.5	212	21	7
EPTC	(10 gal/A)	2.5	191	34	15
Untreated Check		.	236	0	0
Mean			242	16	-7
High mean			288	34	19
Low mean			185	0	-27
Coeff. of variation			10	29	-185
LSD(1 Percent)			46	9	23
LSD(5 Percent)			34	7	17
No. of reps			4	4	4

Experiment continued on next page.

Preplant incorporated herbicides plus starter fertilizer applied at planting, Glyndon, 1984. (experiment continued from last page)

Herbicide Treatment	Fertilizer Treatment	Herbicide Rate (lb/A)	Sucro (%)	Root Yield (ton/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popl 60ft
Diethatyl		7	17.2	20.6	664	1.6	6383	78
Diethatyl	(3.33 gal/A)	7	17.4	23.0	616	1.4	7276	83
Diethatyl	(6.66 gal/A)	7	17.8	22.6	634	1.5	7293	74
Diethatyl	(10 gal/A)	7	17.4	21.5	655	1.5	6790	68
Control	(3.33 gal/A)	0	17.3	20.5	649	1.5	6459	80
Control	(6.66 gal/A)	0	17.5	21.3	623	1.5	6821	75
Control	(10 gal/A)	0	17.3	22.5	675	1.6	7015	73
Diethatyl+Cycloate		5+3	17.3	22.2	626	1.5	6980	76
Diethatyl+Cycloate	(3.33 gal/A)	5+3	17.3	22.3	682	1.6	6905	77
Diethatyl+Cycloate	(6.66 gal/A)	5+3	17.4	24.1	695	1.6	7566	74
Diethatyl+Cycloate	(10 gal/A)	5+3	17.3	23.7	655	1.5	7383	71
EPTC		2.5	17.8	21.9	658	1.6	7030	77
EPTC	(3.33 gal/A)	2.5	17.7	21.2	648	1.6	6803	77
EPTC	(6.66 gal/A)	2.5	17.8	22.8	638	1.5	7342	74
EPTC	(10 gal/A)	2.5	17.3	21.6	702	1.7	6717	68
Untreated Check		.	17.1	24.6	767	1.8	7431	72
Mean			17.4	22.3	662	1.6	7012	75
High mean			17.8	24.6	767	1.8	7566	83
Low mean			17.1	20.5	616	1.4	6383	68
Coeff. of variation			4.3	8.1	17	13.7	9	6
LSD(1 Percent)			1.4	3.4	208	0.4	1206	9
LSD(5 Percent)			1.0	2.6	156	0.3	906	7
No. of reps			4.0	4.0	4	4.0	4	4

Summary

Sugarbeet stands after thinning were adequate even though some treatments reduced prethinning populations (see previous table). Reductions in prethinning sugarbeet populations did not result in reduced extractable sucrose.

Preplant incorporated herbicides and granular insecticides, Hillsboro, 1984. Herbicide treatments were applied in 17 gpa water at 40 psi to the center four rows of six row plots and rototiller incorporated May 14 when the air temp.= 72F, soil temp. at six inches=49F, soil moisture in top four inches of soil= 16.5%, and the wind was east 3-6 mph. The rototiller was set four inches deep for treatments containing EPTC or cycloate and two inches deep for all other herbicide treatments. Beta 1132 sugarbeet seed was planted 1.25 inches deep in 22 inch rows and granular insecticide applied on May 15. Many inches of rain and standing water during June caused considerable sugarbeet and weed stand reduction in parts of the plot area. Sugarbeet injury and yellow foxtail control were evaluated June 29. Ten sugarbeets from each plot were rated by Dr. Albin Anderson and coworkers in Entomology for root maggot damage July 24 using the following scale: 0 = no damage, 1 = 1-4 small scars, 2 = 5-10 small scars or up to 3 larger scars, 3 = more than 3 larger scars, 4 = 50-75% of root blackened by scars, 5 = more than 75% blackened or a dead beet. The mean of these ten observations is the sugarbeet damage rating for each plot.

Treatment	Rate (lb/A)	-------- June 29 -------- Sugarbeet injury rating	Yellow Foxtail control rating	July 24 Sugarbeet damage rating (0-5)
		------------ (%) -----------		
Counter	1	0	0	1.0
Lorsban	1.5	0	0	1.4
Temik	1.5	0	0	0.8
Dyfonate	1.5	0	0	1.0
EPTC	3	10	95	2.5
Diethatyl	6	8	100	---
Ethofumesate	3.75	0	88	---
Cycloate	4	0	100	---
Diallate	4	0	99	---
TCA	7	0	78	---
EPTC+Counter	3+1	0	91	1.2
EPTC+Lorsban	3+1.5	0	92	1.5
EPTC+Temik	3+1.5	0	94	0.7
EPTC+Dyfonate	3+1.5	0	85	1.5
Diethatyl+Counter	6+1	0	85	1.4
Diethatyl+Lorsban	6+1.5	10	100	1.1
Diethatyl+Temik	6+1.5	0	95	0.9
Diethatyl+Dyfonate	6+1.5	3	96	0.8
Ethofumesate+Counter	3.75+1	0	77	0.9
Ethofumesate+Lorsban	3.75+1.5	0	85	1.7
Ethofumesate+Temik	3.75+1.5	0	83	0.9
Ethofumesate+Dyfonate	3.75+1.5	0	90	1.2

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Treatment	Rate (lb/A)	June 29 Sugarbeet injury rating	June 29 Yellow Foxtail control rating (%)	July 24 Sugarbeet damage rating (0-5)
Cycloate+Counter	4+1	0	99	1.5
Cycloate+Lorsban	4+1.5	0	94	1.6
Cycloate+Temik	4+1.5	0	96	1.1
Cycloate+Dyfonate	4+1.5	0	96	1.4
Diallate+Counter	4+1	0	99	1.6
Diallate+Lorsban	4+1.5	5	98	2.1
Diallate+Temik	4+1.5	0	99	1.0
Diallate+Dyfonate	4+1.5	0	98	0.8
TCA+Counter	7+1	0	82	1.8
TCA+Lorsban	7+1.5	0	80	1.8
TCA+Temik	7+1.5	0	72	0.8
TCA+Dyfonate	7+1.5	0	80	1.7
Mean		1	80	1.3
High mean		10	100	2.5
Low mean		0	0	0.7
Coeff. of variation		216	7	40.5
LSD(1 Percent)		5	12	1.0
LSD(5 Percent)		4	9	0.7
No. of reps		3	3	4.0

Summary

Ethofumesate and TCA gave or tended to give less control of yellow foxtail than EPTC, cycloate, diallate, or diethatyl. The insecticides did not consistently affect weed control and the herbicides did not affect root maggot injury to sugarbeets when in combinations. Diethatyl + Counter, ethofumesate + Counter, and EPTC + Dyfonate gave less yellow foxtail control than diethatyl, ethofumesate, and EPTC, respectively.

EPTC and cycloate in combination with liquid insecticide, Hillsboro, 1984. Herbicide and herbicide + insecticide tank-mix combination treatments were applied in 17 gpa water at 40 psi to the center four rows of six row plots and incorporated with a rototiller set four inches deep May 14 when the air temp.= 72F, soil temp. at six inches=49F, soil moisture in the top four inches=16.5%, and the wind was east at 3-6 mph. Beta 1132 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 15. Ten sugarbeets from each plot were rated for root maggot damage by Dr. Albin Anderson and coworkers from Entomology July 24 using the following rating scale: 0 = no damage, 1 = 1-4 small scars, 2 = 5-10 small scars or up to 3 larger scars, 3 = more than 3 larger scars, 4 = 50-75% of root blackened by scars, 5 = more than 75% blackened or a dead beet. The mean of these ten ratings is the sugarbeet damage rating for each plot. Sugarbeets were harvested from 70 feet of the center two rows in each plot on September 26.

Treatment	Rate (lb/A)	- June29 - Sgbt inj ratg	Grft Yeft cntl ratg ----(%)---	Sucros (%)	Root Yield (ton/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	7-24 Sgbt damg ratg 0-5
EPTC+Dyfonate	2.5+2	13	80	16.5	9.5	789	1.8	2786	1.3
EPTC+Dyfonate	2.5+4	10	83	16.9	11.2	800	1.8	3327	1.1
Cycloate+Dyfonate	4+2	1	96	17.0	12.2	782	1.8	3663	1.5
Cycloate+Dyfonate	4+4	0	92	17.1	11.7	842	2.0	3546	1.8
EPTC+Lorsban	2.5+2	1	84	17.0	6.8	784	1.8	2070	2.1
Cycloate+Lorsban	4+2	1	96	17.0	9.0	788	1.8	2702	2.1
EPTC	2.5	9	89	17.2	8.6	851	2.0	2603	2.1
Cycloate	4	0	99	17.0	7.9	880	2.0	2335	2.2
Mean		4	90	17.0	9.6	814	1.9	2879	1.8
High mean		13	99	17.2	12.2	880	2.0	3663	2.2
Low mean		0	80	16.5	6.8	782	1.8	2070	1.1
Coeff. of variation		97	4	4.1	22.2	13	11.0	20	37.9
LSD(1 Percent)		8	8	1.4	4.3	207	0.4	1178	1.4
LSD(5 Percent)		6	6	1.0	3.1	152	0.3	866	1.0
No. of reps		4	4	4.0	4.0	4	4.0	4	4.0

Summary

EPTC + Dyfonate gave less control of green and yellow foxtail than EPTC alone. EPTC + Dyfonate at 2.5+4 and cycloate + Dyfonate gave or tended to give more extractable sucrose/A than the other treatments.

Postemergence applied tank-mix combinations of Lorsban and Dyfonate plus herbicides, St. Thomas, 1984. Hilleshog Monoricca sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 9. Treatments were applied in 17 gpa water at 40 psi to the center four rows of six row plots 4:30 pm June 12(air temp.=69F, soil temp. at six inches=63F, wind NW 5-8 mph, rel. humid.=86%, partly sunny) when sugarbeets had 2-6 leaves and green foxtail was 1-6 inches tall. Sugarbeet injury and green foxtail control were evaluated June 26. Ten sugarbeets from each plot treated with Losrsban or Dyfonate were rated by Dr. Albin Anderson and coworkers in Entomology July 19 for root maggot damage using the following scale: 0 = no damage, 1 = 1-4 small scars, 2 = 5-10 small scars or up to 3 larger scars, 3=more than 3 larger scars, 4=50-75% of root blackened by scars, 5=more than 75% blackened or dead beet. The mean of these 10 ratings is the sugarbeet damage rating. Only one of the herbicide without insecticide treatments was rated for sugarbeet damage and used as an "untreated check" in making comparisons.

Treatment	Rate (lb/A)	June 26 Sugarbeet injury rating ------- (%)	June 26 Gr.Fxtl control rating -------	July 19 Sugarbeet damage rating 0 - 5
Lorsban	1.5	0	0	2.5
Dyfonate	1.5	0	0	2.4
Desmedipham	1	0	34	---
Sethoxydim+OC	.2+.25G	0	100	---
PP-005+OC	.125+.25G	0	83	---
Desmedipham+Dalapon	1+2	6	91	---
Des+Etho+Sethox+OC	.75+1.5+.2+.25G	10	97	---
Desmedipham+Endothall	1+.5	4	54	2.3
Desmedipham+Lorsban	1+1.5	0	28	2.1
Sethoxydim+OC+Lorsban	.2+.25G+1.5	0	100	1.6
PP-005+OC+Lorsban	.125+.25G+1.5	0	73	2.3
Desmedipham+Dalapon+Lorsban	1+2+1.5	0	90	2.4
De+Et+Seth+OC+Lor	.75+1.5+.2+.25G+1.5	9	96	2.1
Desmed+Endothall+Lorsban	1+.5+1.5	6	73	2.3
Desmedipham+Dyfonate	1+1.5	3	35	2.6
Sethoxydim+OC+Dyfonate	.2+.25G+1.5	0	100	2.3
PP-005+OC+Dyfonate	.125+.25G+1.5	0	84	2.2
Desmedipham+Dalapon+Dyfonate	1+2+1.5	9	94	2.2
De+Et+Seth+OC+Dyf	.75+1.5+.2+.25G+1.5	5	98	2.1
Desmed+Endothall+Dyfonate	1+.5+1.5	11	68	2.4
Mean		3	70	2.3
High mean		11	100	2.6
Low mean		0	0	1.6
Coeff. of variation		158	12	13.3
LSD(1 Percent)		9	15	0.6
LSD(5 Percent)		7	12	0.4
No. of reps		4	4	4.0

Summary

Desmedipham + endothall + Lorsban and desmedipham + endothall + Dyfonate gave better green foxtail control than desmedipham + endothall. Sugarbeets treated with sethoxydim + Lorsban had less root maggot injury than with Lorsban alone.

Amount of time needed for hand weeding following various herbicide treatments, Glyndon, 1984. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Preplant incorporated herbicides were applied and incorporated with a rototiller set four inches deep on May 1 when the air temp.=51F, soil temp. at six inches=40F, soil moisture in the top four inches= 15.5%, and wind was NW at 5-10 mph. GW Mono-Hy R1 sugarbeet seed was planted 1.25 inches deep in 22 inch rows May 2. The first split of split application postemergence treatments was applied 1:30 pm May 25 (air temp.=53F, soil temp. at six inches=56F, soil moisture in top four inches=15%, wind N 15-20mph) when sugarbeets were in the 2 leaf stage, common lambsquarters was 2-4 leaf, wild buckwheat was 1-2 leaf and green foxtail was one inch tall. Second splits of postemergence treatments were applied 8:15 pm June 2 (air temp.=68F, wind was 0 mph) when sugarbeets were in the 2-4 leaf stage and most weeds had died or stopped growing due to the May 25 herbicide application. Five inches of rain fell between June 4 and June 8. The third split of postemergence treatments was applied 5:30 pm June 23 when the air temp.=73F, soil temp. at six inches = 70F, relative humidity=36%, and the wind was NW at 15-25 mph. Sugarbeets were 6-8 leaf on June 23 and only a few cotyledon weeds remained in the plots due to the two earlier herbicide applications. Plots were cultivated June 27 and thinned by hand July 13. On July 12 the amount of time to weed the four treated rows from each plot and the four untreated rows adjacent to each plot was recorded. Sugarbeets were harvested from 60 feet of the center two rows of each plot October 4.

Treatment	Rate (lb/A)	Sucros (%)	Root Yield (ton/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt popl per 60ft
EPTC+Cycloate	1.5+2.5	16.7	18.1	649	1.5	5476	53
Diethatyl+Cycloate	4+3	16.1	19.3	684	1.5	5627	52
Ethofumesate+Cycloate	3+3	16.0	18.0	753	1.6	5097	45
Desmedipham 2X	.5	16.6	19.8	648	1.4	5945	52
Desmed 2X/Desmedipham+Dalapon	.5/1+2	15.5	18.7	784	1.7	5140	49
Desmed/Desmed+Dalapon 2X	.5/.5+1	16.4	18.9	699	1.5	5560	48
EPTC+Cycloate/Desmed 2X	1.5+2.5/.5	16.6	16.3	688	1.5	4860	41
EPTC+Cyc/De 2X/De+Dala	1.5+2.5/.5/1+2	15.9	16.3	744	1.6	4619	42
EPTC+Cy/De/De+Dala 2X	1.5+2.5/.5/.5+1	16.1	16.9	732	1.6	4837	45
Diet+Cyclo/Desmedipham 2X	4+3/.5	16.0	17.9	760	1.6	5081	47
Diet+Cycl/Des 2X/Des+Dala	4+3/.5/1+2	16.1	16.9	719	1.6	4832	47
Diet+Cyc/Des/Des+Dala 2X	4+3/.5/.5+1	16.2	18.3	695	1.5	5329	48
Etho+Cyclo/Desmedipham 2X	3+3/.5	15.8	16.9	720	1.6	4699	37
Etho+Cycl/Des 2X/Des+Dala	3+3/.5/1+2	16.1	15.4	695	1.6	4460	39
Etho+Cycl/Des/Des+Dala 2X	3+3/.5/.5+1	16.4	16.9	715	1.6	4932	41
Mean		16.2	17.7	712	1.6	5099	46
High mean		16.7	19.8	784	1.7	5945	53
Low mean		15.5	15.4	648	1.4	4460	37
Coeff. of variation		3.8	9.4	12	9.8	11	12
LSD(1 Percent)		1.2	3.1	165	0.3	1016	11
LSD(5 Percent)		0.9	2.4	124	0.2	764	8
No. of reps		4.0	4.0	4	4.0	4	4

Experiment continued on next page.

Experiment continued from last page.

Summary

Plots treated with split desmedipham at 0.5 lb/A required the most hand weeding but also had the highest yield in extractable sucrose. All plots with significantly lower sugarbeet stand than the split desmedipham plots also yielded significantly less. Sugarbeet injury apparently caused sugarbeet stand and yield losses in this experiment.

Amount of time needed for hand weeding following various herbicide treatments, Glyndon, 1984.

Treatment	Rate (lb/A)	--- June 27 --- Sgbt inj ratg	Colq cntl ratg (%)	Grft cntl ratg	- July 12 - Time to weed treat - sec/plot -	Time to weed untrt	Reduc in time (%)
EPTC+Cycloate	1.5+2.5	10	91	98	75	158	54
Diethatyl+Cycloate	4+3	13	94	98	49	143	64
Ethofumesate+Cycloate	3+3	20	99	100	56	143	62
Desmedipham 2X	.5	13	94	39	105	195	46
Desmed 2X/Desmedipham+Dalapon	.5/1+2	24	95	83	38	188	79
Desmed/Desmed+Dalapon 2X	.5/.5+1	21	99	99	15	180	91
EPTC+Cycloate/Desmed 2X	1.5+2.5/.5	49	99	100	30	105	76
EPTC+Cyc/De 2X/De+Dala	1.5+2.5/.5/1+2	46	98	100	4	98	96
EPTC+Cy/De/De+Dala 2X	1.5+2.5/.5/.5+1	50	100	100	4	105	96
Diet+Cyclo/Desmedipham 2X	4+3/.5	35	100	100	34	128	81
Diet+Cycl/Des 2X/Des+Dala	4+3/.5/1+2	31	100	100	23	128	88
Diet+Cyc/Des/Des+Dala 2X	4+3/.5/.5+1	35	100	100	8	150	96
Etho+Cyclo/Desmedipham 2X	3+3/.5	58	100	100	11	98	93
Etho+Cycl/Des 2X/Des+Dala	3+3/.5/1+2	48	100	100	0	113	100
Etho+Cycl/Des/Des+Dala 2X	3+3/.5/.5+1	41	100	100	0	128	100
Mean		33	98	94	30	137	81
High mean		58	100	100	105	195	100
Low mean		10	91	39	0	98	46
Coeff. of variation		32	3	6	82	27	18
LSD(1 Percent)		20	6	10	46	71	27
LSD(5 Percent)		15	5	8	35	53	20
No. of reps		4	4	4	4	4	4

Summary

Postemergence herbicides plus soil applied herbicides caused more sugarbeet injury than soil applied herbicides alone. Sugarbeet injury was less or tended to be less with diethatyl + cycloate than with EPTC + cycloate or ethofumesate + cycloate. All treatments gave good to excellent common lambsquarters control and all except split desmedipham and split desmedipham plus desmedipam + dalapon gave excellent green foxtail control. Very little hand labor was required to hand weed plots treated with the more effective herbicide combinations.

Variety response to high rates of herbicide, Glyndon, 1984. Five herbicide treatments were applied in east-west blocks and ten sugarbeet varieties were seeded 1.25 inches deep in four 22 inch north-south rows across the 29 foot wide herbicide blocks. Herbicide treatment by variety combinations were replicated four times. All herbicides were applied in 17 gpa water at 40 psi and incorporation of preplant incorporated herbicides was with a 10 foot tandem disk set 4 inches deep plus a spike-tooth harrow. Herbicide treatments included EPTC (PPI) at 4 lb/A, diethatyl (PPI) at 4 lb/A, diethatyl (PPI) at 8 lb/A, diethatyl (PPI) at 4 lb/A plus desmedipham (Post) at 2 lb/A, and diethatyl (PPI) at 4 lb/A plus desmedipham (Post) at 0.75 lb/A plus desmedipham (Post) at 0.75 lb/A plus desmedipham + dalapon (Post) at 1 + 2 lb/A. EPTC and diethatyl were applied May 1 when the air temp = 51 F, soil temp at six inches = 40 F, wind was NW 5 - 10 mph, and soil moisture in the top four inches of soil = 15.5%. Sugarbeet varieties were planted May 2. Desmedipham at 2 lb/A and the first application of desmedipham at 0.75 lb/A were applied 9:00 P.M. June 2 (air temp = 68 F, soil moisture was dry, wind = 0 mph) when sugarbeets were in the 4 leaf stage. The second application of desmedipham at 0.75 lb/A was applied 9:30 A.M. June 14 (air temp = 61 F, soil temp at six inches = 63 F, relative humidity = 74%, wind SE 2 - 3 mph) when sugarbeets were at the 6 - 10 leaf stage. Desmedipham + dalapon at 1 + 2 lb/A was applied 5:30 P.M. June 23 (air temp = 73 F, soil temp at six inches = 70 F, relative humidity = 36%, wind NW 15 - 25 mph, clear and sunny) when sugarbeets had 8 - 14 leaves.

Sugarbeet populations were counted May 31 in 58 feet of row in plots to be treated with postemergence herbicides. Following postemergence herbicide application sugarbeet populations were counted again June 23 to determine percent sugarbeet stand reduction.

All plots were thinned by hand beginning June 25, cultivated June 27, and hand weeded throughout the growing season.

Preplant incorporated diethatyl at 4 lb/A was applied to reduce the weed populations and the hand weeding needed in the "untreated" plots and in the plots treated with postemergence herbicides. Diethatyl (PPI) is a safe treatment which would not be expected to cause any sugarbeet stunting or stand reduction. The plots treated only with preplant incorporated diethatyl at 4 lb/A were used as an "untreated check" in making comparisons.

Sugarbeets were harvested October 3 from 29 feet of each of the center two rows of each plot.

Table 1. Change in prethinning sugarbeet population caused by postemergence herbicide application.

Sugarbeet variety	PPI diethatyl (4 lb/A) + post desmedipham (2 lb/A)	PPI diethatyl (4 lb/A) post desmed (0.75 lb/A) post desmed (0.75 lb/A) post desmed+dalapon (1+2 lb/A)
	(% reduction)	
Beta 6264	6	11
ACH 14	12	2
Beta 1132	9	6
Beta 1230	14	4
Maribo Ultramono	12	4
Beta 3394	11	3
BJ 19	14	3
GW 107	20	9
BJ Monofort	10	8
ACH 164	13	9
LSD (0.05)	13	7

Stand reductions were similar for all sugarbeet varieties.

Table 2. Influence of herbicides on harvested plant population of several sugarbeet varieties.

Sugarbeet variety	Diethatyl (4 lb/A)	Diethatyl (8 lb/A)	EPTC (4 lb/A)	Diethatyl + desmedipham (4+2 lb/A)	Diethatyl/ desmed/ desmed/ desmed + dalapon	Variety mean
	(plants/60 ft row)					
Beta 6264	62	60	59	67	59	62
ACH 14	63	66	64	66	64	65
Beta 1132	58	63	59	67	65	63
Beta 1230	59	62	62	60	64	61
Maribo Ultramono	59	61	59	59	56	59
Beta 3394	60	54	64	64	60	60
BJ 19	61	60	60	63	58	60
GW 107	66	66	66	69	66	66
BJ Monofort	64	63	62	68	63	64
ACH 164	67	66	66	70	64	66
Herbicide mean	62	62	62	65	62	

Herbicide LSD (0.05) = 1.9
Variety LSD (0.05) = 2.8
Herbicide X Variety LSD interaction NS, LSD (0.05) = 6.4

Harvested sugarbeet populations were good with all varieties and all herbicide treatments. Some sugarbeet varieties had slightly higher populations than other varieties averaged over all herbicide treatments.

Table 3. Influence of herbicides on extractable sucrose from several sugarbeet varieties.

Sugarbeet variety	Diethatyl (4 lb/A)	Diethatyl (8 lb/A)	EPTC (4 lb/A)	Diethatyl + desmedipham (4+2 lb/A)	Diethatyl/ desmed/ desmed/ desmed + dalapon	Variety mean
	(extractable sucrose, lb/A)					
Beta 6264	6608	6677	6472	6463	5570	6352
ACH 14	5757	6418	6128	6014	5824	6028
Beta 1132	6242	6880	6319	6611	6611	6548
Beta 1230	6527	6921	6666	6143	6283	6508
Maribo Ultramono	6549	7130	6386	6454	6347	6573
Beta 3394	6472	6165	6118	6596	5853	6241
BJ 19	6577	6021	6002	6395	5971	6193
GW 107	5016	5680	5433	5787	5000	5362
BJ Monofort	5940	6438	6490	6501	6069	6288
ACH 164	6033	6574	6499	6528	6138	6354
Herbicide mean	6170	6490	6246	6364	5967	

Herbicide LSD (0.05) = NS
Variety LSD (0.05) = 229
Herbicide X Variety interaction significant LSD (0.05) = 511

GW 107 yielded less extractable sucrose than other sugarbeet varieties averaged over all herbicide treatments. Beta 6264, Beta 3394, and BJ 19 yielded less extractable sucrose when treated with PPI diethatyl at 4 lb/A + post desmedipham at 0.75 lb/A + post desmedipham at 0.75 lb/A + post desmedipham + dalapon at 1+2 lb/A than when treated with PPI diethatyl at 4 lb/A.

Table 4. Influence of herbicides on yield of several sugarbeet varieties.

Sugarbeet variety	Diethatyl (4 lb/A)	Diethatyl (8 lb/A)	EPTC (4 lb/A)	Diethatyl + desmedipham (4+2 lb/A)	Diethathyl/ desmed/ desmed/ desmed + dalapon	Variety mean
	(Tons/A)					
Beta 6264	20.6	20.8	21.7	20.4	19.0	20.5
ACH 14	18.3	18.7	18.8	18.2	17.5	18.3
Beta 1132	20.3	21.7	20.8	20.5	20.6	20.8
Beta 1230	21.3	21.8	21.8	20.0	20.2	21.0
Maribo Ultramono	20.0	21.5	20.9	20.3	20.1	20.6
Beta 3394	20.3	19.5	20.9	19.7	19.0	19.9
BJ 19	22.4	21.1	20.6	21.3	20.8	21.3
GW 107	16.7	18.7	18.6	18.7	17.0	18.0
BJ Monofort	19.6	20.4	21.6	21.4	21.0	20.8
ACH 164	19.7	19.7	19.9	20.1	20.0	19.9
Herbicide mean	19.9	20.3	20.6	20.1	19.5	

Herbicide LSD (0.05) = NS
Variety LSD (0.05) = 0.7
Herbicide X Variety interaction NS, LSD (0.05) = 1.5

Table 5. Influence of herbicides on sugar content of several sugarbeet varieties.

Sugarbeet variety	Diethatyl (4 lb/A)	Diethatyl (8 lb/A)	EPTC (4 lb/A)	Diethatyl + desmedipham (4+2 lb/A)	Diethatyl/ desmed/ desmed/ desmed + dalapon	Variety mean
	- - - - - - - - - - - - - -	(% sucrose)	- - - - - - - - - - - - - - -			
Beta 6264	17.8	17.8	16.9	17.6	16.8	17.4
ACH 14	17.7	18.8	18.2	18.2	18.3	18.2
Beta 1132	17.4	17.6	17.2	17.9	17.8	17.6
Beta 1230	17.3	17.8	17.3	17.3	17.5	17.4
Maribo Ultramono	18.2	18.4	17.3	17.7	17.8	17.9
Beta 3394	17.8	17.7	16.8	18.4	17.5	17.6
BJ 19	16.8	16.5	16.7	17.1	16.5	16.7
GW 107	17.0	17.2	16.8	17.5	16.8	17.0
BJ Monofort	17.2	17.8	17.0	17.0	16.6	17.1
ACH 164	17.1	18.4	18.1	17.9	17.4	17.8
Herbicide mean	17.4	17.8	17.3	17.7	17.3	

Herbicide LSD (0.05) = NS
Variety LSD (0.05) = 0.4
Herbicide X Variety interaction NS, LSD (0.05) = 0.8

Table 6. Influence of herbicides on impurity index of several sugarbeet varieties.

Sugarbeet variety	Diethatyl (4 lb/A)	Diethatyl (8 lb/A)	EPTC (4 lb/A)	Diethatyl + desmedipham (4+2 lb/A)	Diethatyl/ desmed/ desmed/ desmed + dalapon	Variety mean
	- - - - - - - - - - - -	(impurity index)	- - - - - - - - - - - - - - -			
Beta 6264	697	658	838	677	804	730
ACH 14	724	561	685	606	625	640
Beta 1132	738	631	798	649	644	690
Beta 1230	741	722	798	744	723	746
Maribo Ultramono	686	645	795	687	726	708
Beta 3394	728	694	844	606	764	727
BJ 19	851	887	882	809	877	861
GW 107	801	750	832	659	798	774
BJ Monofort	762	718	802	739	830	770
ACH 164	697	592	662	606	756	662
Herbicide mean	742	686	792	679	755	

Herbicide LSD (0.05) = NS
Variety LSD (0.05) = 52
Herbicide X Variety interaction NS, LSD (0.05) = 116

Weed control with herbicides plus rotary hoe and harrow, St. Thomas, 1984.

Preplant incorporated herbicides were applied to the center four rows of six row plots in 17 gpa of water and rototiller incorporated May 8 when air temperature was 55 F, soil temperature 6 inches deep was 45 F, wind was N at 20 to 25 mph, and moisture in the top 4 inches of soil was 15%. The rototiller was operated 4 inches deep for EPTC and cycloate and 2 inches deep for other PPI treatments. Hilleshog Monoricca seed was planted 1.25 inches deep in 22 inch rows May 9. Postemergence herbicides were applied in 17 gpa of water June 12 at 3:00 P.M. when air temperature was 69 F, soil temperature 6 inches deep was 63 F, relative humidity was 86%, wind was NW at 5 to 8 mph, sky was partly cloudy, sugarbeets had 2 to 6 leaves, prostrate pigweed was 2 leaf to 4 inches diameter, and green foxtail was 1 to 6 inches tall. Herbicides were applied to a 4 row wide by 96 foot plot in each of four replications. A rotary hoe and harrow were operated across the herbicide treatments on June 19 when sugarbeets had 4 to 8 leaves. Each implement cultivated 32 feet and 32 feet was left uncultivated. The rotary hoe was a John Deere with two bars and was operated at 5.5 to 7.5 mph. The Melroe spring tooth harrow had five bars and was operated at 4 mph. Weed control and sugarbeet injury were evaluated visually June 26.

Table 1. Sugarbeet injury from herbicides plus rotary hoe and harrow.

Herbicide	Rate	Cultivation			Herbicide mean
		None	Rotary hoe	Harrow	
	(lb/A)	- - - (% injury) - - -			
EPTC+cycloate	2+2	4	4	6	5
Diethatyl+diallate	6+2	2	2	10	5
Ethofumesate+diallate	3.75+2	2	2	8	4
Desmedipham	1	0	0	0	0
Desmedipham+dalapon	1+2	2	2	2	2
Desmedipham+sethoxydim+OC[a]	1+0.2	0	0	6	2
Desmedipham+ethofumesate	0.75+1.5	0	0	0	0
EPTC+cyclo/desm	2+2/1	11	12	20	14
EPTC+cyclo/desm+trifluralin	2+2/1+0.75	12	12	20	15
EPTC+cyclo/desm+ ethalfluralin	2+2/1+0.75	11	11	15	12
Cultivation mean		5	5	9	

Herbicide LSD (0.05) = 1.7
Cultivation LSD (0.05) = 2.2
Herbicide X cultivation interaction was significant, LSD (0.05) = 2.9

[a]OC = Atplus 411 F at 1 qt/A.

Table 2. Green foxtail control from herbicides plus rotary hoe and harrow.

Herbicide	Rate	Cultivation None	Cultivation Rotary hoe	Cultivation Harrow	Herbicide mean
	(lb/A)	- - -	(% control)	- -	
EPTC+cycloate	2+2	97	100	100	99
Diethatyl+diallate	6+2	96	97	98	97
Ethofumesate+diallate	3.75+2	97	98	99	98
Desmedipham	1	22	28	35	28
Desmedipham+dalapon	1+2	80	82	88	83
Desmedipham+sethoxydim+OC[a]	1+0.2	98	98	99	98
Desmedipham+ethofumesate	0.75+1.5	46	54	60	53
EPTC+cyclo/desm	2+2/1	99	99	100	99
EPTC+cyclo/desm+trifluralin	2+2/1+0.75	99	99	100	99
EPTC+cyclo/desm+ ethalfluralin	2+2/1+0.75	99	100	100	99
Cultivation mean		83	85	88	

Herbicide LSD (0.05) = (0.05) = 2.5
Cultivation LSD (0.05) = 1.6
Herbicide X cultivation interaction significant, LSD (0.05) = 4.3

[a]OC = Atplus 411 F at 1 qt/A

Table 3. Prostrate pigweed control from herbicides plus rotary hoe and harrow.

Herbicide	Rate	None	Rotary hoe	Harrow	Herbicide mean
	(lb/A)	- - -	(% control)	- -	
EPTC+cycloate	2+2	70	80	84	78
Diethatyl+diallate	6+2	97	98	98	97
Ethofumesate+diallate	3.75+2	90	93	94	92
Desmedipham	1	38	40	40	39
Desmedipham+dalapon	1+2	68	70	76	71
Desmedipham+sethoxydim+OC[a]	1+0.2	78	81	89	83
Desmedipham+ethofumesate	0.75+1.5	92	94	98	95
EPTC+cyclo/desm	2+2/1	97	99	100	98
EPTC+cyclo/desm+trifluralin	2+2/1+0.75	97	98	99	98
EPTC+cyclo/desm+ ethalfluralin	2+2/1+0.75	99	100	100	99
Cultivation mean		83	85	88	

Herbicide LSD (0.05) = 2.9
Cultivation LSD (0.05) = 1.6
Herbicide X cultivation interaction significant, LSD (0.05) = 5.1

[a]OC = Atplus 411 F at 1 qt/A

The rotary hoe and harrow improved control of green foxtail and prostrate pigweed compared to herbicides alone. This was more evident with herbicide treatments that gave fair to poor weed control. The harrow gave better weed control but also caused more sugarbeet injury than the rotary hoe. PPI EPTC + cycloate + post desmedipham gave nearly complete weed control and no late weed emergence occurred prior to weed control evaluation. Thus the potential benefit of trifluralin and ethalfluralin for control of late emerging weeds could not be determined.

Multispecies evaluation of preplant incorporated herbicides, Fargo (NW Section 22), 1984. Herbicides were applied in 17 gpa water at 40 psi to the center 7 feet of 10 foot plots and incorporated twice with a field cultivator plus harrow May 17 when the air temp. = 74°F, soil temp at six inches = 55°F, and wind was SW 20-25 mph. Era wheat, Moore oats, Park barley, Clark flax, GW MonoHy M-7 sugarbeets, Funks G4171 and Funks G4141 corn, Evans soybeans, redroot pigweed, wild mustard, siberian foxtail millet, Fleetwood navy beans, and Seedtech 315 sunflowers were seeded May 18. Kochia and wild buckwheat were natural infestations. Crop injury and weed control were evaluated July 14. Visual ratings of crop and weed stand reductions were taken August 17. The data reported here is the mean of these two evaluations.

Treatment	Rate (lb/A)	Percent Control Wht	Bly	Oats	Flax	Sgbt	Millt	Rrpw	Wimu	Corn	Sunf	Soyb	Navyb	Kocz	Wibw
SC-15574	2	2	4	12	27	11	44	12	0	3	16	17	19	15	13
SC-15574	4	0	0	26	20	9	22	10	50	4	4	4	9	5	41
Imazaquin	.25	22	24	34	95	100	100	100	100	100	83	8	12	98	95
M0070701	.25	0	0	8	5	13	28	41	30	10	7	12	22	43	14
M0070523	.25	0	0	0	21	15	24	52	30	9	2	15	12	9	31
M0070492	.25	0	0	0	6	9	12	6	33	4	15	9	8	13	40
M0070701	.5	0	0	0	14	16	27	17	50	7	17	21	25	59	60
M0070523	.5	0	0	3	17	17	15	21	35	6	7	14	30	46	71
M0070492	.5	0	5	6	23	8	7	6	0	5	0	13	7	17	13
M0070701	1	18	10	20	39	80	70	77	77	33	31	60	96	96	84
M0070523	1	3	4	3	18	89	61	77	87	8	34	45	93	87	97
M0070492	1	0	0	0	9	6	3	7	7	5	4	8	8	5	19
Cyanazine-W	4	34	36	62	61	73	90	34	98	7	31	48	97	100	98
Cyan+Atrazine SD050093	2.66+1.33	58	52	82	65	99	93	82	100	4	61	90	94	98	100
Cynmethylin	1.25	24	42	74	14	26	97	28	82	56	13	20	34	86	36
Acetochlor	2	44	49	80	81	36	96	97	73	13	18	11	10	81	28
Alachlor	3	21	20	40	19	53	87	93	70	3	22	7	1	64	8
Mean		13	15	26	31	39	51	45	54	16	21	24	34	54	50
High Mean		58	52	82	95	100	100	100	100	100	83	90	97	100	100
Low Mean		0	0	0	5	6	3	6	0	3	0	4	1	5	8
Coeff. of variation		67	80	59	47	42	31	34	59	58	62	50	26	31	33
LSD (1 Percent)		20	26	35	33	36	35	33	71	21	29	26	20	37	36
LSD (5 Percent)		15	19	26	24	27	26	25	53	16	22	19	15	28	27
No. of Reps.		3	3	3	3	3	3	3	3	3	3	3	3	3	3

Multispecies evaluation of preemergence herbicides, Fargo (NW Section 22), 1984. Era wheat, Moore oats, Park barley, Clark flax, MonoHy M-7 sugarbeets, Funks G4171 and Funks G4141 corn, Evans soybeans, redroot pigweed, wild mustard, siberian foxtail millet, Fleetwood navy beans, and Seedtech 315 sunflowers were seeded May 18. Kochia and wild buckwheat were natural infestations. Herbicides were applied in 17 gpa water at 40 psi to the center 7 feet of 10 foot plots following seeding May 18 when the air temp. = 79° F, soil temp. at six inches = 55° F, and wind was west at 20 mph. Crop injury and weed control were evaluated July 14. Visual ratings of crop and weed stand reductions were taken August 17. The data reported here is the means of these two evaluations.

Treatment	Rate (lb/A)	Percent Control													
		Wht	Bly	Oats	Flax	Sgbt	Millet	Rrpw	Wimu	Corn	Sunf	Soyb	Navyb	Kochia	Wibw
PPG-1259	.25	0	0	0	11	3	5	13	23	3	0	3	15	28	33
PPG-1013	.25	5	0	0	98	98	100	88	100	9	30	22	35	97	77
SC-15574	2	0	3	6	40	27	36	51	57	17	15	18	15	49	14
SC-15574	4	2	2	12	26	27	65	57	68	10	9	7	10	56	8
Imazaquin	.25	28	57	63	66	100	98	100	100	84	82	11	15	100	97
Cynmethylin	1.25	4	8	23	31	39	75	20	30	12	4	6	3	70	19
Fluorochloridone	.5	0	0	0	18	44	24	68	98	0	6	32	14	88	11
Mean		6	10	15	41	48	58	57	68	19	21	14	15	70	37
High Mean		28	57	63	98	100	100	100	100	84	82	32	35	100	97
Low Mean		0	0	0	11	3	5	13	23	0	0	3	3	28	8
Coeff. of variation		144	87	83	34	21	29	23	29	46	61	61	90	25	38
LSD (1 Percent)		20	21	31	35	25	42	33	48	22	32	22	35	44	36
LSD (5 Percent)		14	15	22	25	18	30	23	35	16	23	15	25	31	25
No. of Reps.		3	3	3	3	3	3	3	3	3	3	3	3	3	3

Multispecies evaluation of postemergence herbicides, Fargo (NW Section 22), 1984. Crops and weeds were planted May 18. Herbicides were applied in 17 gpa water at 40 psi to the center 7 feet of 10 foot plots 4:15 p.m. June 21 when the air temp. = 80° F, soil temp. at six inches = 66° F, wind was SE at 10-15 mph, relative humidity = 68%, and sky was sunny. Era wheat, Moore oats, and Park barley was 10-14 inches tall, Clark flax was 1-4 inches tall, Kochia was just emerging to 2 inches tall, siberian foxtail millet was 1-5 inches tall, GW Mono Hy M-7 sugarbeets were 4-6 leaf, redroot pigweed had 2 leaves, wild mustard had 4-8 leaves, Funks G4171 and Funks G4141 corn was 6-8 inches tall, Seedtec 315 sunflowers were cotyledon to 6 leaf, Evans soybeans were 2 leaf to second trifoliolate, and Fleetwood navy beans were 2 leaf to second trifoliolate. Weed control and crop injury were evaluated July 14.

Treatment	Rate (lb/A)	Percent Control													
		Wht	Bly	Oats	Flax	Sugbt	Millet	Rrpw	Wimu	Corn	Sunf	Soyb	Navyb	Kochia	Wibw
PPG-1259	.19	0	0	0	13	25	7	25	53	3	25	37	32	20	23
Imazaquin	.25	93	93	93	92	100	93	89	100	94	100	3	7	99	65
Fomesafen+X-77	.25+.25%	15	7	3	98	67	37	96	100	0	57	5	23	87	53
Lactofen+X-77	.25+.25%	23	15	22	100	65	40	100	100	10	62	7	23	92	72
DPX-F6025+X-77	.0078+.25%	35	25	28	60	83	55	77	100	0	98	0	48	50	47
PPG-1013	.03125	32	22	25	99	75	40	96	100	3	47	3	30	98	67
AC-222293	.5	0	0	72	67	77	3	0	100	0	0	83	50	63	45
Bentazon	.75	0	0	0	10	100	0	43	100	0	89	0	3	68	67
Acifluorfen	.375	33	17	20	100	73	67	99	100	15	77	0	18	93	81
Methazole	1	0	0	0	10	70	50	72	92	7	12	23	28	23	93
Mean		23	18	26	65	73	39	70	95	13	57	16	26	69	61
High Mean		93	93	93	100	100	93	100	100	94	100	83	50	99	93
Low mean		0	0	0	10	25	0	0	53	0	0	0	3	20	23
Coeff. of variation		37	40	24	18	21	59	16	6	48	22	53	66	32	34
LSD(1 Percent)		20	17	15	27	36	54	26	13	15	29	20	41	52	49
LSD(5 Percent)		15	12	11	20	27	40	19	10	11	21	15	30	38	36
No. of Reps.		3	3	3	3	3	3	3	3	3	3	3	3	3	3

Hard red spring wheat and durum response to herbicides, Fargo 1984. An experiment was conducted at Fargo, ND on a silty clay soil with pH 7.5 and 6.1% organic matter to evaluate hard red spring wheat and durum response to various herbicides. Preplant incorporated treatments (PPI) were applied May 4 and incorporated into the top 3 to 4 inches of soil with a field cultivator. Seven hard red spring wheat ('Marshall', 'ERA', 'ND600', 'ND597', 'Alex', 'Len', and 'Stoa') and 2 durum ('Vic' and 'Ward') were seeded on May 4 in 6 inch rows immediately after incorporation of the PPI treatments. Postemergence (P) treatments were applied on June 18 to 4 to 5 leaf wheat with 72 F, 40% relative humidity, and moist soil. All treatments were applied with a bicycle wheel plot sprayer delivering either 17 or 8.5 gpa at 35 psi for the PPI and P treatments, respectively. Precipitation for a 2 week period following the application of the PPI and P treatments was 0.37 and 0.44 inch. The experiment was a split block design with whole plots consisting of herbicide treatments. There were 3 replications and experimental units were 10 by 12 ft. Crop injury was rated on July 9.

Treatment	Stage	Rate oz/A	Cultivar Marshall	ERA	ND600	ND597	Alex	Len	Stoa	Vic	Ward	Mean
			(% injury)									
Triallate	PPI	24	13	18	14	7	23	15	19	13	3	12
Triallate	PPI	48	38	52	35	16	45	30	33	15	12	29
AC 222,293	Post	12	2	2	5	3	2	3	2	28	8	6
Difenzoquat	Post	16	7	12	41	25	32	45	27	55	13	25
Fenoxaprop	Post	2	41	41	62	47	20	18	38	89	77	50
Fenoxaprop	Post	3	33	45	77	36	31	35	52	91	86	56
Picloram	Post	.38	19	20	15	22	17	12	19	24	20	12
Picloram	Post	.75	17	17	15	3	9	8	8	13	15	18
Picloram+2,4-D	Post	.38+6	13	15	14	8	12	2	18	15	17	12
Fluorochloridone	Post	4	0	3	8	8	3	0	7	5	3	4
Mean			18	22	29	18	19	17	22	35	25	
LSD (0.05)			TRT = 5		CULT = 5		TRT x CULT = 17					
			(yield % of control)									
Triallate	PPI	24	99	86	95	113	95	107	80	101	104	98
Triallate	PPI	48	71	57	74	82	67	89	59	84	94	76
AC 222,293	Post	12	102	97	100	103	90	106	84	85	88	94
Difenzoquat	Post	16	111	100	92	99	82	72	88	64	96	89
Fenoxaprop	Post	2	85	77	72	83	86	105	79	15	34	70
Fenoxaprop	Post	3	46	61	50	48	89	83	72	23	24	54
Picloram	Post	.38	96	97	103	92	92	104	102	106	108	92
Picloram	Post	.75	103	85	91	94	89	99	82	83	105	100
Picloram+2,4-D	Post	.38+6	91	85	85	91	91	101	84	100	102	93
Fluorochloridone	Post	4	94	85	94	91	84	91	77	90	70	85
Mean			90	83	86	90	87	96	80	75	82	
LSD (0.05)			TRT = 9		CULT = 9		TRT x CULT = 28					

Summary

Fenoxaprop caused the greatest wheat injury and wheat yield reductions compared to the other treatments. Fenoxaprop reduced the yield of 'Ward' and 'Vic' durum more than the yield of the hard red spring wheat cultivars. 'Len' hard red spring wheat and 'Vic' durum were injured more than other cultivars by difenzoquat. 'Alex' and 'ERA' hard red spring wheat were injured more by PPI triallate than the other cultivars. All cultivars were injured more by triallate at 48 compared to 24 oz/A. Any treatment containing picloram or fluorochloridone did not seriously injure any cultivar. AC 222,293 caused 28% injury to 'Vic' durum, but AC 222,293 did not injure the other cultivars.

Fall herbicide treatments for wild oat control in wheat,Fargo 1983-84. Treatments were applied on November 7 with 55F, clear sky and lumpy soil and incorporated with a rototiller into either the top 4.5 inches (deep) or the top 1.5 inches (shallow) of soil. 'Era' wheat was seeded on April 25 either 1.5 to 2 inches (deep) or 1 inch (shallow) deep.The experimental design was a split-split block with 4 replications and experimental units were 10 by 11 ft.

		---------Wheat--------				
	Rate	Deep	Shal	Deep	Shal	%cntl
Treatment	lb/A	gram/44ft2		%ir	%ir	Wioa
Trifluralin shallow	.38	436	520	3	5	26
Trifluralin shallow	.5	630	658	0	0	45
Trifluralin shallow	.75	715	1120	8	8	64
Trifluralin shallow	1.5	492	788	29	41	88
Trifluralin deep	.38	529	559	3	3	23
Trifluralin deep	.5	527	754	6	8	33
Trifluralin deep	.75	727	865	21	24	69
Trifluralin deep	1.5	590	903	34	40	92
Triallate shallow	1.25	1265	1507	0	4	92
Triallate deep	1.25	1341	1606	0	2	93
Trifl+Triallate shall	.38+1.25	1355	1438	9	8	94
Trifl+Triallate shall	.5+1.25	1066	1051	3	6	87
Trifl+Triallate shall	.75+1.25	1179	1556	6	11	90
Trifl+Triallate shall	1.5+1.25	723	964	43	49	92
Trifl+Triallate deep	.38+1.25	1345	1515	1	8	91
Trifl+Triallate deep	.5+1.25	1225	1527	4	10	89
Trifl+Triallate deep	.75+1.25	1192	1469	1	9	93
Trifl+Triallate deep	1.5+1.25	553	856	36	48	95
Untreated check	0	214	246	0	0	0
Mean		847	1047	11	15	71
High mean		1355	1606	43	49	95
Low mean		214	246	0	0	0
Coeff. of variation		17	18	59	46	17
LSD(1 Percent)		265	354	12	13	23
LSD(5 Percent)		199	266	9	10	17
No. of reps		4	4	4	4	4

Summary

Wild oat control with trifluralin tended to be greater with deep compared to shallow incorporation. Wild oat control with triallate or triallate+trifluralin was excellent regardless of incorporation depth. Wheat injury increased with increasing herbicide rate and was not influenced by seeding or incorporation depth. Wheat yield generally related to wild oat control and/or wheat injury.

Fall herbicide treatments in wheat, Minot 1983-1984. Treatments were applied October 26, 1983 with 60 F, moist soil, cloudy sky and 15 to 20 mph SW wind and incorporated with a rototiller into either the top 1.5 to 2 inches (shallow) or the top 3.5 to 4 inches (deep) of soil. 'Alex' wheat was seeded on May 17 either 1.5 to 2 inches (deep) or 1 inch (shallow) deep. The experimental design was a split-split block with 4 replications. Evaluation was on July 13.

		Wheat			
		Yield			
	Rate	Deep	Shal	--% Injury--	
Treatment	oz/A	grams/ 48ft2		Deep	Shal
Triallate shallow	20	1329	1102	8	10
Triallate deep	20	1311	1103	11	10
Clsu no incorp	.25	1439	1264	3	19
Clsu shallow	.25	1332	1196	4	13
Clsu deep	.25	1488	1328	1	3
Trifluralin shallow	8	1306	1256	5	23
Trifluralin deep	8	1244	1261	4	21
Trifluralin shallow	16	1288	1143	31	29
Trifluralin deep	16	1182	1282	33	18
Triallate+Clsu no incorp	20+.25	1270	1279	0	4
Triallate+Clsu shallow	20+.25	1391	1198	7	17
Triallate+Clsu deep	20+.25	758	1180	3	13
Triallate+Trifluralin shallow	20+8	1217	1136	4	15
Triallate+Trifluralin deep	20+8	1089	1153	9	20
Triallate+Trifluralin shallow	20+16	1084	912	40	48
Triallate+Trifluralin deep	20+16	1219	1138	32	36
Control	0	1341	1136	0	5
Mean		1252	1180	11	18
High mean		1488	1328	40	48
Low mean		758	912	0	3
Coeff. of variation		17	15	79	51
LSD(1 Percent)		400	334	17	17
LSD(5 Percent)		301	251	13	13
No. of reps		4	4	4	4

Summary

Triallate caused only slight wheat injury and injury was similiar regardless of seeding or incorporation depth. Shallow seeded wheat was injured more than deep seeded wheat by chlorsulfuron or triallate + chlorsulfuron. Treatments containing trifluralin at 8 oz/A caused more injury to shallow seeded wheat compared to deep seeded wheat; however, wheat injury was similiar regardless of seeding or incorporation depth when trifluralin was applied at 16 oz/A either alone or with triallate.

Spring PPI triallate and trifluralin combinations in wheat,Fargo 1984. Spring PPI treatments were applied on April 23 with 70 F, 30% relative humidity, clear sky, moist soil,and 0 to 5 mph S wind and incorporated once with either a field cultivator into the top 3 to 4 inches of soil (deep) or with a harrow into the top inch of soil (shallow). 'Era' wheat was seeded either deep (1.5 to 2 inches) or shallow (1 inch) on April 25. Postemergence diclofop was applied May 25 with 42 F, 60% relative humidity, cloudy sky, and 20 to 25 mph NW wind to 2 leaf wheat and 2.5 leaf wild oat. The experimental design was a split-split block with 4 replications and experimental units were 10 by 11 ft.

		-------- Wheat	--------			
Treatment	Rate lb/A	Deep grams/44ft2	Shal	Deep %ir	Shal %ir	%cntl Wioa
Triallate PPI Shallow	0.75	719	645	4	9	65
Triallate PPI Shallow	1	914	688	4	4	55
Triallate PPI Shallow	2	1209	896	27	32	80
Trifluralin PPI Shallow	0.3	359	333	0	0	18
Trifluralin PPI Shallow	0.5	691	553	18	19	53
Trifluralin PPI Shallow	0.7	890	649	23	24	54
Triallate+trif PPI Shallow	0.75+0.3	838	650	10	8	65
Triallate+trif PPI Shallow	0.75+0.5	1095	651	15	16	76
Triallate+trif PPI Shallow	0.75+0.7	995	691	29	30	83
Triallate+trif PPI Shallow	1+0.3	1024	917	10	18	69
Triallate+trif PPI Shallow	1+0.5	793	694	26	34	76
Triallate+trif PPI Shallow	1+0.7	911	364	37	43	76
Triallate+trif PPI Shallow	2+0.3	1072	1202	29	29	83
Triallate+Trif PPI Shallow	2+0.5	1075	838	31	40	89
Triallate+Trif PPI Shallow	2+0.7	793	907	41	44	89
Diclofop Post Shallow	1.0	995	928	0	0	0
Diclofop Post Shallow	1.25	646	464	0	0	0
Untreated check	0	813	535	0	0	0
Triallate PPI Deep	0.75	1231	1047	1	0	71
Triallate PPI Deep	1	1029	1082	0	3	70
Triallate PPI Deep	2	1272	1053	14	14	73
Trifluralin PPI Deep	0.3	934	703	1	5	44
Trifluralin PPI Deep	0.5	725	460	18	16	34
Trifluralin PPI Deep	0.7	710	753	25	31	61
Triallate+Trif PPI Deep	0.75+0.3	1240	1067	4	5	64
Triallate+Trif PPI Deep	0.75+0.5	882	738	21	20	68
Triallate+Trif PPI Deep	0.75+0.7	824	825	38	39	85
Triallate+Trif PPI Deep	1+0.3	973	759	15	21	68
Triallate+Trif PPI Deep	1+0.5	1075	930	24	28	80
Triallate+Trif PPI Deep	1+0.7	1058	945	31	33	88
Triallate+Trif PPI Deep	2+0.3	1302	1260	13	13	86
Triallate+Trif PPI Deep	2+0.5	1380	1149	24	33	86
Triallate+Trif PPI Deep	2+0.7	870	835	39	43	83
Diclofop Post Deep	1	693	745	0	0	0
Diclofop Post Deep	1.25	1291	877	0	0	0
Untreated check	0	736	613	0	0	0

Table . Continued

Treatment	Rate lb/A	Wheat Deep grams/44ft2	Wheat Shal grams/44ft2	Wheat Deep %ir	Wheat Shal %ir	%cntl Wioa
Mean		946	790	16	18	58
High mean		1380	1260	41	44	89
Low mean		359	333	0	0	0
Coeff. of variation		33	40	63	51	28
LSD(1 Percent)		581	578	18	17	30
LSD(5 Percent)		440	437	14	13	23
No. of reps		4	4	4	4	4

Summary

Wild oat control with triallate and trifluralin applied alone or in combination tended to be greater with deep incorporation compared to shallow incorporation. Wheat injury was influenced most by herbicide rate. Wheat injury at each rate was not influenced by seeding or incorporation depth. Wheat yield generally related to wild oat control and/or crop injury.

UC82042 for wild oat control in wheat, Fargo 1984. Preplant incorporated treatments (PPI) were applied April 23 with 70 F, 40% relative humidity, moist/mallow soil, and incorporated with a field cultivator into the top 3 to 4 inches of soil. °Era° wheat was seeded on April 25 and preemergence incorporated treatments (PEI) were applied immediately after seeding with 50 F,50% relative humidity, cloudy sky, 0 to 3 mph SE wind, moist/mallow soil, and incorporated with a harrow into the top 1 inch of soil. Postemergence treatments (2-31f) were applied May 22 with 63 F, 25% relative humidity,partly cloudy sky,20 to 25 mph S wind,and dry soil to 2 to 3 leaf wheat, 1 to 3 leaf wild oat,and 2 to 6 leaf wild mustard. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Ratings were taken on July 23.

Treatment	Rate lb/A	-- Wheat -- %std	%ir	- % control - Wioa	Wimu
Triallate PPI	1	0	0	72	0
UC82042 PPI	2	0	0	11	23
UC82042 PPI	4	0	0	33	0
UC82042 PPI	6	0	0	15	0
Z-7653-A PPI	4	0	0	33	10
Triallate PEI	1	0	0	41	0
UC82042 PEI	2	0	0	15	0
UC82042 PEI	4	0	0	0	0
UC82042 PEI	6	0	0	16	0
Z-7653-A PEI	4	0	0	20	0
Diclofop 2-31f	1	0	0	85	0
UC82042 2-31f	2	0	0	13	23
UC82042 2-31f	4	0	0	9	19
UC82042 2-31f	6	0	0	15	45
Z-7653-A 2-31f	4	0	0	11	23
UC82042+Brox&MCPA-6E 2-31f	4+.5	0	0	13	89
UC82042+Brox&MCPA-6E 2-31f	6+.5	0	0	24	95
Bromoxynil&MCPA-6E 2-31f	.5	0	0	0	96
Untreated check	0	0	0	0	0
Mean		0	0	22	22
High mean		0	0	85	96
Low mean		0	0	0	0
Coeff. of variation		0	0	90	76
LSD(1 Percent)		0	0	38	32
LSD(5 Percent)		0	0	28	24
No. of reps		4	4	4	4

Summary

None of the treatments reduced wheat stand or caused wheat injury. Neither UC82042 or Z-7653-A gave adequate control of wild oat or wild mustard. Diclofop gave 85% wild oat control and all treatments containing bromoxynil + MCPA gave excellent wild mustard control.

Wild oat control in wheat, Fargo 1984. 'Era' hard red spring wheat was seeded May 4. Treatments were applied either May 25 (2-lf) with 45 F, 70% relative humidity, and cloudy sky to 2 to 3 leaf wheat and to 2.5 leaf wild oat or June 13 (4-lf) with 66 F, 50% relative humidity, and clear sky to 4 to 6 leaf wheat and wild oat. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Crop injury and wild oat control ratings were taken July 20. Wild oat density averaged 20 plants/ft2.

Treatment		Rate oz/A	----- Wheat---- Yield bu/A	%ir	% cntl Wioa
Barban	2-lf	4	48.6	0	68
Barban+Nitrogen	2-lf	4+1G	29.7	0	71
Barban	2-lf	6	33.5	0	77
Diclofop	2-lf	8	39.9	0	48
Diclofop	2-lf	12	34.9	0	54
Diclofop+Barban	2-lf	8+4	31.5	0	75
AC-222293	2-lf	5	41.1	1	96
AC-222293	2-lf	7.5	45.4	0	98
Fenoxaprop	2-lf	1	31.3	0	26
Fenoxaprop	2-lf	2	39.2	4	70
Diclofop	4-lf	16	53.0	0	79
Barban	4-lf	4	36.5	0	35
Barban	4-lf	6	40.2	0	51
Difenzoquat	4-lf	6	28.1	3	92
Difenzoquat	4-lf	12	28.4	5	98
Difenzoquat+barban	4-lf	6+4	47.0	1	94
AC-222293	4-lf	7.5	41.6	1	97
AC-222293	4-lf	10	45.5	3	97
AC-222293	4-lf	12.5	45.6	1	99
Fenoxaprop	4-lf	1	45.8	5	88
Fenoxaprop	4-lf	2	27.0	28	96
Untreated check		0	39.0	0	0
Mean			38.8	2	73
High mean			53.0	28	99
Low mean			27.0	0	0
Coeff. of variation			20.2	115	13
LSD(1 Percent)			17.0	5	18
LSD(5 Percent)			12.8	4	14
No. of reps			3.0	4	4

Summary

AC-222293 gave 96% or greater wild oat control regardless of wild oat stage at application. Difenzoquat gave 94% or greater wild oat control. There was no increase in wild oat control when barban was added to difenzoquat. Diclofop applied at the 2-lf stage at 8 and 12 oz/A gave 48 and 54% wild oat control. The addition of barban at 4 oz/A to diclofop at 8 oz/A increased wild oat control to 75%. Wild oat control with fenoxaprop was better when fenoxaprop was applied at the 4-lf compared to the 2-lf stage. Fenoxaprop at 2 oz/A applied at the 4-lf stage caused 30% wheat injury and wheat yield was reduced compared to other treatments. Wheat yields generally related to the level of wild oat control.

Wild oat control in wheat, Minot 1984.'Coteau'wheat was seeded on April 19 and the 2 leaf (2-lf) treatments were applied May 17 to 1 to 2 leaf wild oat and wheat with 72F,20 to 35 mph W wind, clear sky,40% relative humidity and dry cloddy soil. The 4 leaf (4-lf) treatments were applied June 5 to 3 to 4 leaf wheat and wild oat with 65F, 0 to 4 mph N wind, 60% relative humidity, and wet soil. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 23 ft.. Evaluation was on July 13.

Treatment		Rate oz/A	Yield Wheat bu/A	% cntl Wioa
Barban	2-lf	4	6.4	41
Barban+Nitrogen	2-lf	4+1G	8.3	47
Barban	2-lf	6	7.7	35
Diclofop	2-lf	8	7.8	50
Diclofop	2-lf	12	7.8	42
Diclofop+Barban	2-lf	8+4	9.1	62
AC-222293	2-lf	5	13.6	81
AC-222293	2-lf	7.5	14.9	87
Fenoxaprop	2-lf	1	8.1	53
Fenoxaprop	2-lf	2	12.6	83
Diclofop	4-lf	16	14.6	90
Barban	4-lf	4	6.9	40
Barban	4-lf	6	6.5	41
Difenzoquat	4-lf	6	8.4	39
Difenzoquat	4-lf	12	8.3	43
Difenzoquat+Barban	4-lf	6+4	9.6	39
AC-222293	4-lf	7.5	14.0	73
AC-222293	4-lf	10	11.4	70
AC-222293	4-lf	10	10.9	80
Fenoxaprop	4-lf	1	10.6	89
Fenoxaprop	4-lf	2	11.7	96
Untreated check		0	2.9	0
Mean			9.6	58
High mean			14.9	96
Low mean			2.9	0
Coeff. of variation			43.7	38
LSD(1 Percent)			7.8	40
LSD(5 Percent)			5.9	31
No. of reps			4.0	4

Summary

AC-222293 (2-lf), fenoxaprop and diclofop (4-lf) all provided over 80% wild oat control. The addition of barban to diclofop or difenzoquat did not increase wild oat control compared to diclofop or difenzoquat applied alone. Wheat yields were low due to dry conditions and a heavy wild oat infestation. None of the herbicides caused wheat injury.

Wild oat control in wheat, Williston 1984. Len wheat was seeded on April 17 and the 2 leaf treatments (2-lf) were applied May 17 to 2.5 to 3 leaf wheat and 1 to 3 leaf wild oat with clear sky, 50 F, 5 to 10 mph W wind 30% relative humidity, and moist soil. The 4 leaf treatments were applied May 29 to 3.5 to 4 leaf wheat and wild oat with clear sky, 60 F, 35% relative humidity, and 5 mph SE wind. The experimental design was a randomized complete block with 4 replications.

Treatment		Rate oz/A	Wht %ir	% Cntl Wioa
Barban	2-lf	4	0	79
Barban+Nitrogen	2-lf	4+1G	0	85
Barban	2-lf	6	0	90
Diclofop	2-lf	8	0	80
Diclofop	2-lf	12	0	83
Diclofop+Barban	2-lf	8+4	0	94
AC-222293	2-lf	4	0	97
AC-222293	2-lf	6	0	99
Fenoxaprop	2-lf	1	1	66
Fenoxaprop	2-lf	2	0	87
Diclofop	4-lf	16	0	67
Barban	4-lf	4	0	56
Barban	4-lf	6	0	64
Difenzoquat	4-lf	6	10	78
Difenzoquat	4-lf	12	14	84
Difenzoquat+Barban	4-lf	6+4	4	90
AC-222293	4-lf	6	3	98
AC-222293	4-lf	8	0	98
AC-222293	4-lf	10	0	99
Fenoxaprop	4-lf	1	0	46
Fenoxaprop	4-lf	2	0	71
Untreated check		0	0	0
Mean			1	78
High mean			14	99
Low mean			0	0
Coeff. of variation			203	14
LSD(1 Percent)			5	20
LSD(5 Percent)			4	15
No. of reps			4	4

Summary

Excellent wild oat control was obtained with barban at 6 oz/A (2-lf), diclofop at 12 oz/A (2-lf), diclofop + barban, all AC-222293 treatments, fenoxaprop at 2 oz/A (2-lf), defenzoquat at 12 oz/A, and defenzoquat + barban. Barban, diclofop, and fenoxaprop gave better wild oat control when applied at 2-lf compared to 4-lf. Difenzoquat caused slight wheat injury.

Diclofop and fenoxaprop for wild oat control in wheat, Fargo 1984. 'Era' hard red spring wheat was seeded on May 4. Treatments were applied May 31 with 75 F, 30% relative humidity, and clear sky to 3.5 leaf wheat and wild oat and 2 to 6 leaf wild mustard. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Crop injury and weed control ratings were taken on July 23. Wild oat and wild mustard densities were 10 and 7 plants/ft2, respectively.

		--- Wheat ----			
	Rate	Yield		-% Control -	
Treatment	oz/A	bu/A	%ir	Wioa	Wimu
Fenoxaprop	1	17	1	44	0
Fenoxaprop	2	26	1	92	0
Fenoxaprop	2.5	25	3	96	0
Fenoxaprop+PO	1+.125G	23	0	70	0
Fenoxaprop+PO	2+.125G	21	3	94	0
Fenoxaprop+PO	2.5+.125G	26	3	96	0
Fenoxaprop+Diclofop	.5+6	23	0	33	0
Fenoxaprop+Diclofop	.5+8	23	0	67	0
Fenoxaprop+Diclofop	1+6	22	0	69	0
Fexoxaprop+Diclofop	1+8	22	3	70	10
Fenoxaprop+MCPA-dma	1+4	22	0	19	90
Fenoxaprop+MCPA-dma+PO	1+4+.125G	17	0	6	95
Fenoxaprop+MCPA-bee	1+4	22	0	43	92
Fenoxaprop+MCPA-bee+PO	1+4+.125G	28	0	53	95
Diclofop	8	18	0	41	0
Diclofop	12	18	0	72	0
Diclofop	16	25	0	77	0
Diclofop+PO	8+.25G	14	0	53	0
Diclofop+PO	12+.25G	34	0	77	0
Diclofop+Bromoxynil	16+4	34	3	81	61
Diclofop+Chlorsulfuron	16+.01	30	0	79	97
Diclofop+Brox+Clsu	16+4+.01	38	1	85	94
Untreated check	0	12	0	0	0
Mean		23	1	61	28
High mean		38	3	96	97
Low mean		12	0	0	0
Coeff. of variation		27	303	23	37
LSD(1 Percent)		18	4	26	19
LSD(5 Percent)		13	3	19	14
No. of reps		2	4	4	4

Summary

Fenoxaprop applied at 2 and 2.5 oz/A either alone or with PO gave excellent wild oat control. The addition of MCPA antagonized wild oat control with fenoxaprop. Wild oat control with fenoxaprop was reduced more with the amine formulation compared to the ester formulation of MCPA applied alone provided up to 77% wild oat control. Wild oat control with diclofop tended to increase when diclofop was applied with PO,bromoxynil or chlorsulfuron. Fenoxaprop plus diclofop combinations gave 33 to 70% wild oat control. Treatments containing MCPA or chlorsulfuron gave excellent wild mustard control.

Diclofop and fenoxaprop for wild oat in wheat, Minot 1984. 'Coteau' wheat was seeded April 19 and treatments were applied May 17 with 75 F, 35% relative humidity, cloudy sky, 18 to 30 mph W wind, and dry soil to 2 to 4 leaf wheat and wild oat. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Crop injury and wild oat control ratings were taken July 13.

		---- Wheat ----		
Treatement	Rate oz/A	Yield bu/A	%ir	% cntl Wioa
Fenoxaprop	1	8.6	1	49
Fenoxaprop	2	13.2	1	73
Fenoxaprop	2.5	14.9	3	77
Fenoxaprop+PO	1+.125G	5.8	0	24
Fenoxaprop+PO	2+.125G	5.4	3	37
Fenoxaprop+PO	2.5+.125G	9.3	6	65
Fenoxaprop+Diclofop	.5+6	8.2	0	39
Fenoxaprop+Diclofop	.5+8	9.8	5	72
Fenoxaprop+Diclofop	1+6	9.0	0	60
Fenoxaprop+Diclofop	1+8	8.9	3	55
Fenoxaprop+MCPA-dma	1+4	3.7	0	9
Fenoxaprop+MCPA-dma+PO	1+4+.125G	3.8	0	8
Fenoxaprop+MCPA-bee	1+4	3.9	0	17
Fenoxaprop+MCPA-bee+PO	1+4+.125G	7.7	0	29
Diclofop	8	5.7	0	29
Diclofop	12	8.4	0	52
Diclofop	16	8.4	0	58
Diclofop+PO	8+.25G	9.3	0	55
Diclofop+PO	12+.25G	13.3	0	81
Diclofop+Brox	16+4	10.1	0	59
Diclofop+Clsu	16+.01	8.6	0	60
Diclofop+Brox+Clsu	16+4+.01	10.3	0	73
Untreated check	0	3.3	0	0
Mean		8.2	1	47
High mean		14.9	6	81
Low mean		3.3	0	0
Coeff. of variation		33.8	318	34
LSD(1 Percent)		5.2	5	30
LSD(5 Percent)		3.9	4	22
No. of reps		4.0	4	4

Summary

None of the treatments caused serious wheat injury. Fenoxaprop provided up to 77% wild oat control. The addition of PO at 1pt/A did not increase wild oat control with fenoxaprop. Diclofop applied at 12 oz/A gave 52 and 81% wild oat control alone and with PO at 1 qt/A, respectively. The addition of bromoxynil and/or chlorsulfuron tended to increase wild oat control with diclofop.

Diclofop and fenoxaprop for wild oat in wheat, Williston 1984. 'Len' wheat was seeded April 17. Treatments were applied May 17 with 50 F, 30% relative humidity, clear sky, 5 to 10 mph W wind, and moist soil to 2 to 3 leaf wheat and 1 to 3 leaf wild oat. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 23 ft. Ratings were taken July 12.

Treatment	Rate oz/A	Wht %ir	% cntl Wioa
Fenoxaprop	1	0	46
Fenoxaprop	2	0	68
Fenoxaprop	2.5	0	75
Fenoxaprop+PO	1+.125G	0	44
Fenoxaprop+PO	2+.125G	0	61
Fenoxaprop+PO	2.5+.125G	3	72
Fenoxaprop+Diclofop	.5+6	0	71
Fenoxaprop+Diclofop	.5+8	1	69
Fenoxaprop+Diclofop	1+6	3	34
Fenoxaprop+Diclofop	1+8	1	87
Fenoxaprop+MCPA-dma	1+4	1	28
Fenoxaprop+MCPA-dma+PO	1+4+.125G	0	11
Fenoxaprop+MCPA-bee	1+4	0	36
Fenoxaprop+MCPA-bee	1+4+.125G	0	24
Diclofop	8	0	56
Diclofop	12	0	84
Diclofop	16	0	91
Diclofop+PO	8+.25G	0	85
Diclofop+PO	12+.25G	0	87
Diclofop+Brox	16+4	0	93
Diclofop+Clsu	16+.01	0	92
Diclofop+Brox+Clsu	16+4+.01	0	93
Untreated check	0	0	0
Mean		0	61
High mean		3	93
Low mean		0	0
Coeff. of variation		456	22
LSD(1 Percent)		3	25
LSD(5 Percent)		2	19
No. of reps		4	4

Summary

Fenoxaprop gave similar wild oat control when applied alone or with PO. The addition of MCPA reduced wild oat control with fenoxaprop.The addition of PO at 1 qt/A to diclofop at 8 oz/A increased wild oat control compared to diclofop alone. Diclofop at 16 oz/A gave excellent wild oat control applied alone or with bromoxynil and/or chlorsulfuron. None of the treatments caused wheat injury.

Diclofop and acifluorfen in wheat, Fargo 1984. An experiment was conducted at Fargo, ND to evaluate the effectiveness of diclofop and acifluorfen combinations for wild oat and wild mustard control in wheat. 'Era' hard red spring wheat was seeded on May 4 in 6 inch row spacings. Treatments were applied on June 14 with 62 F, 80% relative humidity, cloudy sky, 0 to 3 mph S wind and wet soil to 4 to 5 leaf wheat, 3 to 6 leaf wild oat, and 0.5 to 10 inch wild mustard. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Wild oat and wild mustard densities were moderate and control was rated on July 23.

Treatment	Rate oz/A	Wht %ir	--- % control --- Wioa	Wimu
Acif-RP+Dicl	2+1	5	80	97
Acif-RP+Dicl	4+1	2	63	95
Brox-2+Acif-RP+Dicl	4+2+1	4	82	98
Brox-2+Acif-RP+Dicl	4+4+1	0	64	96
Diclofop	1	0	85	0
Check		0	0	0
Mean		2	62	64
High mean		5	85	98
Low mean		0	0	0
Coeff. of variation		162	14	2
LSD(1 Percent)		8	23	3
LSD(5 Percent)		5	16	2
No. of reps		3	3	3

Summary

None of the herbicide treatments reduced wheat stand or seriously injured the wheat. Any treatment containing acifluorfen gave excellent wild mustard control. Wild oat control ranged from 80 to 85% when diclofop was applied alone or with acifluorfen at 2 oz/A. When acifluorfen was applied at 4 oz/A with diclofop wild oat control was reduced approximately 20% compared to diclofop applied alone.

The influence of oil volume on the interaction of diclofop plus MCPA and 2,4-D, Fargo 1984. Drill strips of 'Era' wheat, 'Moore' oats, and foxtail millet were seeded on May 25. Treatments were applied across the three species on June 22 to 3 to 4 leaf wheat and oats and 2 to 3 leaf millet with partly cloudy sky, 76 F, 70% relative humidity, and 5 to 12 mph SE wind. The experimental design was a randomized complete block with four replications and experimental units were 10 by 20 ft.

Treatment	Rate oz/A	- Percent injury - Oat	Simi
Diclofop	8	74	78
Diclofop+PO	8+.063G	83	86
Diclofop+PO	8+.125G	91	91
Diclofop+PO	8+.25G	91	94
Diclofop	12	91	92
Diclofop+PO	12+.063G	93	92
Diclofop+PO	12+.125G	94	94
Diclofop+PO	12+.25G	93	91
Diclofop+MCPA-dma	8+4	39	59
Diclofop+MCPA-dma+PO	8+4+.063G	34	55
Diclofop+MCPA-dma+PO	8+4+.125G	33	51
Diclofop+MCPA-dma+PO	8+4+.25G	35	40
Diclofop+MCPA-dma	12+4	59	66
Diclofop+MCPA-bee+PO	12+4+.063G	47	59
Diclofop+MCPA-dma+PO	12+4+.125G	59	66
Diclofop+MCPA-dma+PO	12+4+.25G	48	62
Diclofop+MCPA-bee	8+4	47	60
Diclofop+MCPA-bee+PO	8+4+.063G	33	55
Diclofop+MCPA-bee+PO	8+4+.125G	38	50
Diclofop+MCPA-bee+PO	8+4+.25G	20	39
Diclofop+MCPA-bee	12+4	65	63
Diclofop+MCPA-bee+PO	12+4+.063G	53	63
Diclofop+MCPA-bee+PO	12+4+.125G	66	75
Diclofop+MCPA-bee+PO	12+4+.25G	52	65
Diclofop+2,4-D-dma	8+4	42	31
Diclofop+2,4-D-dma+PO	8+4+.063G	41	49
Diclofop+2,4-D-dma+PO	8+4+.125G	51	54
Diclofop+2,4-D-dma+PO	8+4+.25G	50	47
Diclofop+2,4-D-dma	12+4	59	50
Diclofop+2,4-D-dma+PO	12+4+.063G	65	63
Diclofop+2,4-D-dma+PO	12+4+.125G	67	61
Diclofop+2,4-D-dma+PO	12+4+.25G	62	60
Diclofop+2,4-D-bee	8+4	40	49
Diclofop+2,4-D-bee+PO	8+4+.063G	38	41
Diclofop+2,4-D-bee+PO	8+4+.125G	49	51
Diclofop+2,4-D-bee+PO	8+4+.25G	43	53
Diclofop+2,4-D-bee	12+4	45	40
Diclofop+2,4-D-bee+PO	12+4+.063G	57	57
Diclofop+2,4-D-bee+PO	12+4+.125G	56	66
Diclofop+2,4-D-bee+PO	12+4+.25G	65	63
Untreated check	0	0	0

Table . Continued

Treatment	Rate oz/A	- Percent injury - Oat	Simi
Mean		55	60
High mean		94	94
Low mean		0	0
Coeff. of variation		18	18
LSD(1 Percent)		18	20
LSD(5 Percent)		14	15
No. of reps		4	4

Summary

None of the treatments caused wheat injury. Diclofop applied at 12 oz/A either alone or with PO gave 90% or greater oats and millet control. Control of both species with diclofop at 8 oz/A was increased approximately 20% by the addition of PO at 1 pt and 1 qt/A. These data indicate that the addition of PO can increase the level and consistency of weed control at marginal diclofop rates. The addition of MCPA or 2,4-D antagonized control of both species by diclofop; however, the ester formulations tended to be less antagonistic than the amine formulations of 2,4-D and MCPA. The addition of PO did not overcome the antagonism of diclofop by 2,4-D or MCPA.

Diclofop plus oil and auxin herbicides in wheat, Minot 1984. 'Coteau' wheat was seeded April 19 and treatments were applied on June 5 with 65 F, 60% relative humidity, cloudy sky, 0 to 5 mph N wind, and wet soil to 3 to 4 leaf wheat and wild oat. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Evaluation was on July 13.

Treatment	Rate oz/A	Wheat Yield bu/A	Wheat %ir	% cntl Wioa
Diclofop	8	9.2	0	70
Diclofop	12	7.3	0	76
Diclofop	16	9.6	0	83
Diclofop+PO	8+.125G	10.9	0	78
Diclofop+PO	8+.25G	9.8	0	81
Diclofop+PO	12+.125G	13.0	0	86
Diclofop+PO	12+.25G	9.6	0	85
Diclofop+PO	16+.125G	8.0	3	89
Diclofop+PO	16+.25G	12.0	3	83
Diclofop+MCPA-dma	12+4	7.6	0	49
Diclofop+MCPA-dma+PO	12+4+.25G	7.2	0	46
Diclofop+MCPA-dma	16+4	8.1	0	58
Diclofop+MCPA-dma+PO	16+4+.25G	8.4	0	56
Diclofop+MCPA-bee	12+4	9.3	0	51
Diclofop+MCPA-bee+PO	12+4+.25G	9.1	0	46
Diclofop+MCPA-bee	16+4	11.0	0	66
Diclofop+MCPA-bee+PO	16+4+.25G	8.3	0	47
Diclofop+2,4-D-dma	12+4	8.6	0	43
Diclofop+2,4-D-dma+PO	12+4+.25G	8.9	0	48
Diclofop+2,4-D-dma	16+4	9.9	0	56
Diclofop+2,4-D-dma+PO	16+4+.25G	10.7	0	65
Diclofop+2,4-D-bee	12+4	12.5	0	72
Diclofop+2,4-D-bee+PO	12+4+.25G	9.8	0	40
Diclofop+2,4-D-bee	16+4	11.0	0	65
Diclofop+2,4-D-bee+PO	16+4+.25G	10.0	0	59
Untreated check	0	6.7	0	0
Mean		9.5	0	61
High mean		13.0	3	89
Low mean		6.7	0	0
Coeff. of variation		44.2	726	20
LSD(1 Percent)		7.8	3	23
LSD(5 Percent)		5.9	2	17
No. of reps		4.0	4	4

Summary

The addition of PO tended to increase wild oat control with diclofop at 8 and 12 oz/A; however, diclofop at 16 oz/A gave similar wild oat control when applied alone or with PO. The addition of MCPA or 2,4-D decreased wild oat control with diclofop and the addition of PO did not overcome the antagonism. Wheat was not injured by any treatment.

Diclofop plus 2,4-D and MCPA amine and ester, Fargo 1984. 'Era' wheat and 'Moore' oats were seeded on May 25. Treatments were applied across strips of the two species and to a natural infestation of yellow foxtail on June 22 with cloudy sky, 70 F, 80% relative humidity, and no wind. Wheat and oats were in the 3 to 4 leaf stage and foxtail was in the 2 to 4 leaf stage at the time of application. Light rain occurred within 1.5 h after application. The experiment was a randomized complete block design with 3 replications and experimental units were 10 by 20 ft.

Treatment	Rate oz/A	Percent injury Wheat	Oat	Yeft
Diclofop	8	5	45	55
Diclofop	12	7	72	92
Diclofop	16	8	75	86
Diclofop	20	5	77	94
Diclofop	24	15	83	97
Diclofop+2,4-D-dma	8+2	3	27	35
Diclofop+2,4-D-dma	12+2	5	45	63
Diclofop+2,4-D-dma	16+2	7	69	79
Diclofop+2,4-D-dma	20+2	3	62	78
Diclofop+2,4-D-dma	24+2	3	55	75
Diclofop+2,4-D-dma	8+4	5	25	27
Diclofop+2,4-D-dma	12+4	2	35	35
Diclofop+2,4-D-dma	16+4	2	48	57
Diclofop+2,4-D-dma	20+4	7	53	60
Diclofop+2,4-D-dma	24+4	8	58	73
Diclofop+2,4-D-dma	8+6	3	27	32
Diclofop+2,4-D-dma	12+6	3	28	35
Diclofop+2,4-D-dma	16+6	7	57	78
Diclofop+2,4-D-dma	20+6	3	42	62
Diclofop+2,4-D-dma	24+6	8	53	70
Untreated check	0	0	0	0
Diclofop	8	0	35	47
Diclofop	12	3	83	92
Diclofop	16	2	82	92
Diclofop	20	7	89	94
Diclofop	24	10	93	98
Diclofop+2,4-D-bee	8+2	2	38	45
Diclofop+2,4-D-bee	12+2	3	58	73
Diclofop+2,4-D-bee	16+2	2	63	68
Diclofop+2,4-D-bee	20+2	3	76	89
Diclofop+2,4-D-bee	24+2	8	78	91
Diclofop+2,4-D-bee	8+4	2	37	33
Diclofop+2,4-D-bee	12+4	2	40	48
Diclofop+2,4-D-bee	16+4	3	57	57
Diclofop+2,4-D-bee	20+4	5	57	67
Diclofop+2,4-D-bee	24+4	8	65	79
Diclofop+2,4-D-bee	8+6	0	33	47
Diclofop+2,4-D-bee	12+6	5	38	42
Diclofop+2,4-D-bee	16+6	3	36	40
Diclofop+2,4-D-bee	20+6	7	63	77
Diclofop+2,4-D-bee	24+6	3	68	77
Untreated check	0	0	0	0
Diclofop	8	2	56	74
Diclofop	12	3	65	81
Diclofop	16	8	87	95
Diclofop	20	8	88	97
Diclofop	24	7	88	97

Table . continued

Treatment	Rate oz/A	Percent injury Wheat	Oat	Yeft
Diclofop+MCPA-dma	8+2	5	61	70
Diclofop+MCPA-dma	12+2	7	58	70
Diclofop+MCPA-dma	16+2	3	70	86
Diclofop+MCPA-dma	20+2	10	79	87
Diclofop+MCPA-dma	24+2	5	63	84
Diclofop+MCPA-dma	8+4	2	35	51
Diclofop+MCPA-dma	12+4	2	40	67
Diclofop+MCPA-dma	16+4	7	58	69
Diclofop+MCPA-dma	20+4	8	75	87
Diclofop+MCPA-dma	24+4	8	74	86
Diclofop+MCPA-dma	8+6	3	27	35
Diclofop+MCPA-dma	12+6	5	37	55
Diclofop+MCPA-dma	16+6	7	34	62
Diclofop+MCPA-dma	20+6	3	55	60
Diclofop+MCPA-dma	24+6	7	62	86
Untreated check	0	0	0	0
Diclofop	8	2	51	65
Diclofop	12	2	64	82
Diclofop	16	3	85	93
Diclofop	20	7	85	97
Diclofop	24	10	92	99
Diclofop+MCPA-bee	8+2	5	38	55
Diclofop+MCPA-bee	12+2	5	61	77
Diclofop+MCPA-bee	16+2	7	64	85
Diclofop+MCPA-bee	20+2	5	73	90
Diclofop+MCPA-bee	24+2	8	86	97
Diclofop+MCPA-bee	8+4	5	38	58
Diclofop+MCPA-bee	12+4	5	60	82
Diclofop+MCPA-bee	16+4	3	65	78
Diclofop+MCPA-bee	20+4	3	68	80
Diclofop+MCPA-bee	24+4	3	86	95
Diclofop+MCPA-bee	8+6	2	37	56
Diclofop+MCPA-bee	12+6	2	39	60
Diclofop+MCPA-bee	16+6	5	63	70
Diclofop+MCPA-bee	20+6	7	65	85
Diclofop+MCPA-bee	24+6	5	61	84
Untreated check	0	0	0	0
Mean		5	56	68
High mean		15	93	99
Low mean		0	0	0
Coeff. of variation		79	24	18
LSD(1 Percent)		8	29	26
LSD(5 Percent)		6	22	20
No. of reps		3	3	3

Summary

None of the herbicide treatments caused serious wheat injury. Control,averaged over oats and foxtail,with diclofop alone increased from 55 to 95% as the diclofop rate increased from 8 to 24 oz/A. The addition of MCPA or 2,4-D anatgonized oats and foxtail control with diclofop. MCPA was less anatagonistic than 2,4-D and the ester formulation of 2,4-D and MCPA was less antagonistic than the amine formulation. For example, control with diclofop at 12 oz/A was reduced 12, 35, 45, and 55% when MCPA ester, MCPA amine, 2,4-D ester, and 2,4-D amine were added, respectively,compared to diclofop alone,averaged over broadleaf herbicide rate and species.

AC-222293 plus MCPA and 2,4-D in wheat, Fargo 1984. 'Era' Hard Red Spring wheat was seeded on May 4. Treatments were applied either on May 25 (1-31f) with 42 F, 60 % relative humidity, cloudy sky, and 20 to 25 mph NW wind to 1 to 3 leaf wheat and wild oat and 2 to 4 leaf volunteer sunflower (Vsunf) and wild mustard or on June 13 (4-51f) with 63 F, 40% relative humidity, and 0 to 6 mph NW wind to 4 to 7 leaf wheat and wild oat, 4 to 8 leaf volunteer sunflower,and 0.5 to 12 inch wild mustard. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Crop injury and weed control ratings were taken on July 20.

Treatment		Rate oz/A	---Wheat--- Yield bu/A	%ir	----% Control--- Wioa	Wimu	Vsunf
AC-222293	1-31f	5	50	0	98	95	0
AC-222293	1-31f	7.5	53	0	99	96	0
AC-222293	1-31f	10	55	0	99	99	0
AC-222293+MCPA-bee	1-31f	5+2	59	0	99	99	86
AC-222293+MCPA-bee	1-31f	5+4	59	0	99	98	98
AC-222293+MCPA-bee	1-31f	7.5+2	55	0	99	95	94
AC-222293+MCPA-bee	1-31f	7.5+4	57	1	98	99	85
AC-222293+MCPA-bee	1-31f	10+2	48	1	98	99	72
AC-222293+MCPA-bee	1-31f	10+4	67	1	99	99	98
MCPA-bee	1-31f	2	40	0	24	99	89
MCPA-bee	1-31f	4	31	0	0	89	84
AC-222293+MCPA-dma	1-31f	5+2	56	0	73	98	87
AC-222293+MCPA-dma	1-31f	5+4	53	0	96	96	75
AC-222293+MCPA-dma	1-31f	7.5+2	58	0	99	99	83
AC-222293+MCPA-dma	1-31f	7.5+6	57	1	98	99	90
AC-222293+MCPA-dma	1-31f	10+2	54	3	99	97	84
AC-222293+MCPA-dma	1-31f	10+4	67	0	99	96	91
MCPA-dma	1-31f	2	45	1	0	96	76
MCPA-dma	1-31f	4	40	0	0	99	93
AC-222293	4-51f	7.5	48	0	95	95	0
AC-222293	4-51f	10	42	0	97	97	0
AC-222293	4-51f	12.5	49	0	98	99	0
AC-222293+2,4-D-bee	4-51f	7.5+2	55	1	98	99	97
AC-222293+2,4-D-bee	4-51f	7.5+4	51	3	99	99	98
AC-222293+2,4-D-bee	4-51f	10+2	54	0	97	99	99
AC-222293+2,4-D-bee	4-51f	10+4	50	1	97	99	99
AC-222293+2,4-D-bee	4-51f	12.5+2	52	2	97	99	99
AC-222293+2,4-D-bee	4-51f	12.5+4	52	3	96	99	99
2,4-D-bee	4-51f	2	29	0	25	96	93

Table . Continued

Treatment		Rate oz/A	---Wheat--- Yield bu/A	%ir	----% Control--- Wioa	Wimu	Vsunf
2,4-D-bee	4-51f	4	42	0	0	99	99
AC-222293+2,4-D-dma	4-51f	7.5+2	47	0	95	97	99
AC-222293+2,4-D-dma	4-51f	7.5+4	54	1	97	99	99
AC-222293+2,4-D-dma	4-51f	10+2	53	2	96	99	94
AC-222293+2,4-D-dma	4-51f	10+4	55	4	96	99	99
AC-222293+2,4-D-dma	4-51f	12.5+2	53	1	98	99	99
AC-222293+2,4-D-dma	4-51f	12.5+4	55	2	98	99	99
2,4-D-dma	4-51f	2	40	0	0	94	92
2,4-D-dma	4-51f	4	38	0	0	99	99
Untreated Check		0	42	0	0	0	0
Mean			50	1	76	95	75
High mean			67	4	99	99	99
Low mean			29	0	0	0	0
Coeff. of variation			21	235	18	4	13
LSD(1 Percent)			19	3	26	8	18
LSD(5 Percent)			15	2	19	6	14
No. of reps			4	4	4	4	4

Summary

AC-222293 applied alone or with either formulation of MCPA or 2,4-D provided 95% or greater wild oat and wild mustard control regardless of herbicide rates or application stage. AC-222293 did not control volunteer sunflower. Volunteer sunflower control was 72% or greater with MCPA and 92% or greater with 2,4-D regardless of formulation. Wheat had good tolerance to all herbicide treatments and wheat yields generally related to weed control.

Herbicide combinations with AC-222293 in wheat, Fargo 1984. 'Era' hard red spring wheat was seeded on May 4 in 6 inch rows. Treatments were applied on May 25 with 45 F, 60% relative humidity, cloudy sky, and 20 to 25 mph NW wind to 2 to 3 leaf wheat, 1 to 2.5 leaf wild oat, and 2 to 4 leaf wild mustard. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Wild oat and wild mustard densities were 12 and 15 plants/ft2, respectively, and control was rated on July 23.

Treatment	Rate oz/A	Wheat %ir	Percent control Wioa	Wimu
AC-222293	5	0	96	93
AC-222293	7.5	1	99	97
AC-222293	10	3	99	96
AC-222293+Clsu+Surf	5+.125+.5%	1	97	97
AC-222293+Clsu+Surf	7.5+.125+.5%	0	99	96
AC-222293+Clsu+Surf	10+.125+.5%	4	99	99
Chlorsulfuron+Surf	0.125+.5%	0	35	99
AC222293+Metsulfuron+Surf	5+.125+.5%	10	97	94
AC222293+Metsulfuron+Surf	7.5+.125+.5%	9	99	96
AC222293+Metsulfuron+Surf	10+.125+.5%	1	99	95
Metsulfuron+Surf	0.125+.5%	0	53	99
AC-222293+Bromoxynil	5+2	4	98	91
AC-222293+Bromoxynil	5+4	1	97	96
AC-222293+Bromoxynil	7.5+2	1	99	93
AC-222293+Bromoxynil	7.5+4	1	99	96
AC-222293+Bromoxynil	10+2	0	99	96
AC-222293+Bromoxynil	10+4	3	99	97
Bromoxynil	2	0	0	86
Bromoxynil	4	0	0	96
AC-222293+EH-541	5+6	0	64	99
AC-222293+EH-541	7.5+6	4	85	97
AC-222293+EH-541	10+6	4	98	98
EH-541	6	0	0	99
Untreated check	0	0	0	0
Mean		2	75	92
High mean		10	99	99
Low mean		0	0	0
Coeff. of variation		159	14	4
LSD(1 Percent)		6	19	7
LSD(5 Percent)		4	15	5
No. of reps		4	4	4

Summary

AC-222293 applied at 4, 6, or 8 oz/A either alone or with chlorsulfuron, metsulfuron, or bromoxynil gave 96% or greater wild oat control. EH-541 antagonized wild oat control with AC-222293. Wild oat control was 96 and 64% when AC-222293 was applied alone and with EH-541, respectively. Increasing the AC-222293 rate relative to the EH-541 rate overcame the antagonism of wild oat control. All of the treatments gave excellent wild mustard control. None of the herbicides seriously injured 'Era' wheat.

AC-222293 plus MCPA and 2,4-D, Minot 1984. 'Coteau' wheat was seeded April 17 and the 1 to 3 leaf (1-31f) treatments were applied May 17 to 1 to 3 leaf wild oat and wheat with clear sky, 20 to 30 mph W wind, 70F, and dry soil. The 4 leaf (41f) treatments were applied June 5 to 3 to 4 leaf wild oat and wheat with cloudy sky, 0 to 3 mph N wind 50% relative humidity, 65 F, and moist soil. The experimental design was a randomized complete block with 4 replications. Ratings were taken on July 13.

Treatment		Rate oz/A	Wheat Yield bu/A	% Cntl Wioa
AC-222293	1-31f	4	9.2	60
AC-222293	1-31f	6	10.8	65
AC-222293+MCPA-dma	1-31f	4+4	10.2	73
AC-222293+MCPA-dma+PO	1-31f	4+4+.25G	11.9	79
AC-222293+MCPA-bee	1-31f	4+4	11.2	73
AC-222293+MCPA-bee+PO	1-31f	4+4+.25G	12.4	81
AC-222293+MCPA-dma	1-31f	6+4	10.7	80
AC-222293+MCPA-dma+PO	1-31f	6+4+.25G	16.2	93
AC-222293+MCPA-bee	1-31f	6+4	15.1	90
AC-222293+MCPA-bee+PO	1-31f	6+4+.25G	14.5	88
AC-222293	41f	6	8.3	54
AC-222293	41f	8	8.5	67
AC-222293+2,4-D-dma	41f	6+4	7.9	49
AC-222293+2,4-D-dma+PO	41f	6+4+.25G	8.1	52
AC-222293+2,4-D-bee	41f	6+4	8.9	58
AC-222293+2,4-D-bee+PO	41f	6+4+.25G	9.7	53
AC-222293+2,4-D-dma	41f	8+4	9.1	61
AC-222293+2,4-D-dma+PO	41f	8+4+.25G	8.2	53
AC-222293+2,4-D-bee	41f	8+4	8.5	60
AC-222293+2,4-D-bee+PO	41f	8+4+.25G	8.7	56
Untreated check		0	4.4	0
Mean			10.1	64
High mean			16.2	93
Low mean			4.4	0
Coeff. of variation			20.0	18
LSD(1 Percent)			3.8	21
LSD(5 Percent)			2.9	16
No. of reps			4.0	4

Summary

AC-222293 provided better wild oat control when applied at the 1 to 3 leaf stage compared to the 4 leaf stage. Wild oat control with AC-222293 was better at 6 oz/A compared to 4oz/A at the 1 to 3 leaf stage. The addition of MCPA or 2,4-D to AC-222293 did not reduce wild oat control compared to AC-222293 alone. Wheat yield related to the level of wild oat control.

AC-222293 plus MPCA and oils, Fargo 1984. 'Era' hard red spring wheat and 'Cando' durum were seeded on May 4 and treatments were applied May 31 with 76 F, 40% relative humidity, clear sky, and 5 mph NW wind to 3.5 leaf wild oat and wheat and 2 to 6 leaf wild mustard. Evaluation was on July 20 with weed densities of 2 wild mustard/ft2.

Treatment	Rate oz/A	--Yield-- Wht bu/A	Durm bu/A	% Injury Wht	Durm	% Control Wioa	Wimu
AC-222293	5	1218	1355	1	1	99	78
AC-222293	10	1275	1811	1	7	99	92
AC-222293+MCPA-dma	5+4	1159	1373	0	0	93	91
AC-222293+MCPA-dma	10+4	1199	1450	0	9	99	97
AC-222293+MCPA-dma+PO	5+4+.25G	1208	1284	2	8	99	92
AC-222293+MCPA-dma+PO	10+4+.25G	957	1104	1	11	99	95
AC-222293+MCPA-bee	5+4	1228	1287	3	8	99	96
AC-222293+MCPA-bee	10+4	1155	1525	1	4	99	98
AC-222293+MCPA-bee+PO	5+4+.25G	1245	1442	1	6	99	95
AC-222293+MCPA-bee+PO	10+4+.25G	1945	1788	4	6	99	98
Untreated check	0	762	581	0	0	0	0
Mean		1214	1364	1	5	89	85
High mean		1945	1811	4	11	99	98
Low mean		762	581	0	0	0	0
Coeff. of variation		37	27	202	85	2	8
LSD(1 Percent)		873	729	5	9	3	14
LSD(5 Percent)		648	541	4	7	2	10
No. of reps		4	4	4	4	4	4

Summary

All of the treatments gave over 90% wild oat control. Neither MCPA amine or ester reduced wild oat control with AC-222293. All treatments except AC-222293 at 5 oz/A gave excellent wild mustard control. Durum tended to be more susceptible to herbicide injury than hard red spring wheat.

Wheat,durum, and wild oat response to AC-222293 and difenzoquat, Fargo 1984. 'Era' hard red spring wheat and 'Cando' durum were seeded on May 4. Each 10 by 24 ft experimental unit was seeded half to 'Era' and half to °Cando'. Treatments were applied either on June 1 (3-4 lf) with 50 F, mostly clear sky, and 10 mph NW wind to 3 to 4 leaf wheat and wild oat and 2 to 8 leaf wild mustard or on June 13 (5 lf) with 68 F, partly cloudy sky, and 2 to 8 mph NW wind to 4 to 6 leaf wheat, 5 to 7 leaf wild oat and 1 to 10 inch wild mustard. The experimental design was a randomized complete block with 4 replications. Crop injury and weed control ratings were taken on July 20.

			-- Yield--		% Injury		% control	
Treatment		Rate oz/A	Wheat gram/44ft2	Durum	Wht	Dur	Wioa	Wimu
AC-222293	3-4lf	5	1291	1749	1	2	97	81
AC-222293	3-4lf	7.5	982	1425	1	12	98	91
AC-222293	3-4lf	10	1154	1834	1	9	99	96
AC-222293	3-4lf	15	838	1270	2	14	99	97
Difenzoquat	3-4lf	3	302	614	0	3	21	0
Difenzoquat	3-4lf	4.5	523	575	1	3	38	0
Difenzoquat	3-4lf	6	698	560	0	0	73	0
AC-222293+Dife	3-4lf	5+3	1059	1420	1	14	97	89
AC-222293+Dife	3-4lf	5+4.5	1022	1282	3	16	96	88
AC-222293+Dife	3-4lf	5+6	1137	1331	1	11	97	91
AC-222293+Dife	3-4lf	7.5+3	1365	1301	0	5	99	95
AC-222293+Dife	3-4lf	7.5+4.5	1245	1321	5	10	98	94
AC-222293+Dife	3-4lf	7.5+6	1015	1233	4	15	99	94
AC-222293+Dife	3-4lf	10+3	1081	1217	1	11	99	94
AC-222293+Dife	3-4lf	10+4.5	1189	1282	1	6	99	95
AC-222293+Dife	3-4lf	10+6	1675	1237	0	0	99	98
Diclofop	3-4lf	16	945	1025	0	0	72	0
AC-222293	5lf	10	993	1283	4	11	94	97
AC-222293	5lf	12.5	1145	1291	1	8	98	98
AC-222293	5lf	15	876	930	4	10	96	99
Difenzoquat	5lf	12	877	977	5	8	98	8
Untreated check		0	425	546	0	0	0	0
Mean			993	1168	2	8	85	68
High mean			1675	1834	5	16	99	99
Low mean			302	546	0	0	0	0
Coeff. of variation			17	29	161	85	14	9
LSD(1 Percent)			304	627	5	12	22	11
LSD(5 Percent)			230	474	4	9	17	9
No. of reps			4	4	4	4	4	4

Summary

All treatments containing AC-222293 either alone or in combination with difenzoquat gave excellent wild oat and wild mustard control. 'Era' hard red spring wheat had good tolerance to all treatments; however, AC-222293 caused up to 14% injury and AC-222293 plus difenzoquat caused up to 16% injury to 'Cando' durum. Wheat yields generally related to weed control and/or crop injury.

Effect of spray volume and surfactant amount on AC-222293 activity, Fargo 1984. 'Era' wheat was seeded on May 4 and treatments were applied on June 13 with 70 F, 30% relative humidity, clear sky, and 2 to 8 mph NW wind to 3 to 6 leaf wheat, 4 to 7 leaf wild oat, and 1 to 6 leaf wild mustard. Spray volumes of 4 to 8 gallons/acre were obtained using 80005 and 8001 nozzles, respectively. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Ratings were taken July 23.

Treatment	Rate oz/A	Wheat %ir	---% control--- Wioa	Wimu
AC222293+DM710 4 gpa	5+.25%	0	90	87
AC222293+DM710 4 gpa	7.5+.25%	0	91	93
AC222293+DM710 4 gpa	10+.25%	0	94	91
AC222293+DM710 4 gpa	5+.5%	0	86	85
AC222293+DM710 4 gpa	7.5+.5%	0	90	91
AC222293+DM710 4 gpa	10+.5%	1	94	89
AC222293+DM710 8.5 gpa	5+.25%	0	81	83
AC222293+DM710 8.5 gpa	7.5+.25%	0	96	96
AC222293+DM710 8.5 gpa	10+.25%	0	98	92
AC222293+DM710 8.5 gpa	5+.5%	1	96	90
AC222293+DM710 8.5 gpa	7.5+.5%	1	95	96
AC222293+DM710 8.5 gpa	10+.5%	4	97	93
Untreated check	0	0	0	0
Mean		1	85	83
High mean		4	98	96
Low mean		0	0	0
Coeff. of variation		310	5	8
LSD(1 Percent)		3	7	13
LSD(5 Percent)		3	6	10
No. of reps		4	4	4

Summary

All of the treatments gave excellent wild oat and wild mustard control. AC-222293 applied at 5 oz/A with 0.25% DM710 in 8.5 gpa gave reduced weed control compared to the other treatments.

Factors effecting difenzoquat phytotoxicity, Fargo 1984. 'Era' wheat was seeded on May 4 and treatments were applied June 13 with 72 F, 42% relative humidity, and 3 to 10 mph NW wind to 4 to 5 leaf wheat and 4 to 7 leaf wild oat. Treatments were applied using CO2 or propane (Prop) as a propellent. The pH of the water was adjusted prior to adding the difenzoquat. The pH of all solutions changed to 8.5 after the difenzoquat was added. Several treatments (*) were then adjusted to pH 12. The experiment was a randomized complete block design with 4 replications and experimental units were 10 by 24 ft. Ratings were taken July 20.

Treatment	Rate lb/A	---- Wheat ----- Yield bu/A	%ir	% Cntl Wioa
Difenzoquat CO2 tap water pH 7.3	.75	53	1	99
Difenzoquat CO2 tap water pH 7.3	1	54	0	99
Difenzoquat CO2 tap water pH 8*	.75	51	1	97
Difenzoquat CO2 tap water pH 8*	1	52	1	97
Difenzoquat CO2 tap water pH 6	.75	60	1	99
Difenzoquat CO2 tap water pH 6	1	52	0	98
Difenzoquat CO2 Deion water pH 7	.75	53	1	98
Difenzoquat CO2 Deion water pH 7	1	52	1	98
Difenzoquat Prop tap water pH7.3	.75	59	1	98
Difenzoquat Prop tap water pH7.3	1	49	4	98
Difenzoquat Prop tap water pH 8*	.75	64	0	98
Difenzoquat Prop tap water pH 8*	1	59	0	99
Difenzoquat Prop tap water pH 6	.75	47	1	97
Difenzoquat Prop tap water pH 6	1	51	0	99
Difenzoquat Prop Deion water pH7	.75	52	3	98
Difenzoquat Prop Deion water pH7	1	50	3	98
Untreated check	0	41	0	0
Mean		53	1	92
High mean		64	4	99
Low mean		41	0	0
Coeff. of variation		19	225	2
LSD(1 Percent)		19	5	3
LSD(5 Percent)		14	4	2
No. of reps		4	4	4

Summary

None of the treatments seriously injured the wheat. Excellent wild oat control was obtained regardless of propellent type or water pH.

Hard Red Spring wheat and durum variety response to defenzoquat, 1984. Difenzoquat at 0.88 lb/A was applied across drill strips of Hard Red Spring wheat and durum varieties at Langdon, Carrington, and Minot to crops in the 4 to 5.5 leaf stage. Injury ratings were taken on July 24,25,and 26 at Carrington, Minot, and Langdon respectively.

	Percent control		
HRS wheat	Langdon	,Carrington	Minot
Thatcher	20	25	40
Baart	5	5	10
Waldron	30	30	20
Butte	5	0	0
Coteau	5	0	5
Solar	0	5	25
Len	20	15	35
Walera	5	10	15
Alex	15	10	30
Oslo	0	8	20
Marshall	5	0	15
PR 2369	0	0	5
PR 2360	10	12	10
Columbus	0	5	0
Centa	10	0	0
Erik	5	0	20
Guard	10	35	35
Challenger	10	5	5
Wheaton	5	5	0
Victory 283	15	0	10
Stoa	10	0	5
Katepwa	0	--	--
Apex	5	10	5
Success	5	0	0
Buckshot	5	5	0
X7993	15	20	30
ND 597	5	8	10
ND 600	--	--	20
ND 602	--	--	10
ND 603	5	0	0
ND 604	15	0	15
ND 605	25	5	5
ND 606	0	5	20
ND 607	0	0	0
ND 608	10	0	5
ND 609	30	0	10
ND 610	20	5	5
HS78-1139	--	5	30
Glenmann	--	5	0
Butte	--	--	0
Lew	--	--	40
Olaf	--	--	10
Era	--	0	0

Durum	Langdon	Carrington	Minot
	---------- Percent control	----------	
Rolette	5	0	0
Ward	15	0	5
Crosby	10	10	5
Rugby	10	0	0
Cando	5	0	0
Coulter	5	10	5
Vic	15	30	40
Lloyd	0	0	0
Medora	5	--	15
D793	0	0	10
Arcola	5	--	10
D78177	0	0	0
D804	0	0	5
D79168	0	30	40
D79103	5	30	50
D79209	10	0	5
D79104	15	0	15
D7925	15	35	40
DT 375	15	--	30
D8012	20	0	15
D8016	0	30	40
D8019	0	35	35
D8034	0	45	40
D8082	0	40	35
D80152	5	0	30
D80162	10	35	35
HD81-485	10	35	35
HD81-466	--	0	5
C881-4	10	25	35

Summary

The Hard Red Spring wheat and durum wheat varieties differed in response to difenzoquat. Hard Red Spring wheat varieties that were injured 30% or greater at one or more locations were 'Thatcher', 'Waldron', 'Len', 'Alex', 'Guard', 'X7993', 'ND609', 'HS78-1139' and 'Lew'. Durum varieties were injured by difenzoquat more at Carrington and Minot compared to Langdon. 'Vic' was the only named variety to have 30% or greater injury following difenzoquat application. Twelve of the eighteen numbered durum varieties had injury of 30% or greater following difenzoquat application.

Fluorochloridone plus wild oat herbicides in wheat, Fargo 1984. 'Era' Hard Red Spring wheat was seeded on May 4. Treatments were applied either on May 25 (21f) with 42 F, cloudy sky,and 20 to 25 mph NW wind to 1 to 2 leaf wild oat, 2 to 4 leaf wild mustard, and 2 to 3 leaf wheat or on June 13 (41f) with 68 F,clear sky, and 0-6 mph NW wind to 4 to 6 leaf wild oat, 1 to 10 inch wild mustard, and 3 to 5 leaf wheat. The experimental design was a randomized complete block with four replications. Experimental units were 10 by 24 ft. Wild oat and wild mustard densities were heavy and control ratings were taken on July 20.

Treatment		Rate oz/A	--- Wheat --- Yield bu/A	%ir	-% control- Wioa	Wimu
Barban	2-1f	4	26	0	80	0
Barban	2-1f	6	30	0	88	0
Diclofop	2-1f	8	25	0	43	4
Diclofop	2-1f	12	24	0	48	0
Diclofop	2-1f	16	33	0	65	10
Fluorochloridone	2-1f	1	25	0	0	80
Fluorochloridone	2-1f	2	24	0	26	89
Fluorochloridone	2-1f	4	27	0	30	96
Barban+Fluo	2-1f	4+2	25	0	67	94
Barban+Fluo	2-1f	4+4	21	0	30	82
Barban+Fluo	2-1f	6+2	20	1	77	87
Barban+Fluo	2-1f	6+4	32	0	54	91
Diclofop+Fluo	2-1f	8+2	28	0	39	85
Diclofop+Fluo	2-1f	8+4	25	1	28	94
Diclofop+Fluo	2-1f	12+2	30	0	78	80
Diclofop+Fluo	2-1f	12+4	34	1	66	96
AC-222293	2-1f	5	42	0	96	94
AC-222293	2-1f	10	40	0	98	93
AC-222293+Fluo	2-1f	5+2	34	2	99	98
AC-222293+Fluo	2-1f	5+4	39	0	96	93
AC-222293+Fluo	2-1f	10+2	35	0	89	97
AC-222293+Fluo	2-1f	10+4	39	1	99	97
Difenzoquat	4-1f	10	31	1	99	7
Difenzoquat	4-1f	16	36	1	96	18
Difenzoquat+Fluo	4-1f	10+2	27	4	94	97
Difenzoquat+Fluo	4-1f	10+4	29	4	97	99
Difenzoquat+Fluo	4-1f	16+2	34	4	98	99
Difenzoquat+Fluo	4-1f	16+4	22	6	98	99
Fluorochloridone+PO	4-1f	1+.25G/A	17	0	15	90
Fluorochloridone+PO	4-1f	2+.25G/A	21	0	19	86
Diclofop+Fluo+OC	4-1f	8+2+.25G/A	29	1	75	96
Difenzoquat+Fluo+OC	4-1f	10+2+.25G/A	29	3	94	98
Untreated check		0	12	0	0	0

Table . Continued

Treatment	Rate oz/A	--- Wheat --- Yield bu/A	%ir	-% Wioa	control- Wimu
Mean		29	1	66	71
High mean		42	6	99	99
Low mean		12	0	0	0
Coeff. of variation		23	247	23	14
LSD(1 Percent)		14	4	28	18
LSD(5 Percent)		11	3	21	13
No. of reps		3	4	4	4

Summary

Fluorochloridone applied at 2 and 4 oz/A either alone or with barban, diclofop, AC-222293, or difenzoquat gave excellent wild mustard control. AC-222293 applied alone at 5 or 10oz/A gave over 90% wild mustard con-control. Wild oat control was 90% or greater with all treatments containing AC-222293 or difenzoquat. Wild oat control with diclofop was less than 80% when applied alone or in combinations with fluorochloridone. Flourochloridone antagonized wild oat control with barban. Wild oat control was 88, 77 and 54% with barban applied alone and with flourochloridone at 2 and 4oz/A, respectively. Herbicide treatments increased wheat yield 5 to 30 bu/A compared to the untreated check and generally related to weed control. Wheat treated with AC-222293 generally had the highest yields.

Time of wild oat and wild mustard control in wheat, Fargo NW22 1984.'Era' wheat was seeded on May 4 and the 2-1f treatments(21f)were applied on May 25 to 2 to 4 leaf wild mustard and 1 to 2 leaf wild oat and wheat with clear sky, 20-25mph NW wind and 45 F. The 3-4 leaf treatments(3-41f) were applied June 13 to 0.5 to 8 inch wild mustard, 3 to 6 leaf wild oat, and 3 to 5 leaf wheat with cloudy sky, wet soil, 0 to 6 mph NW wind and 59 F. The 5 leaf treatments (51f) were applied June 18 to 4-7 leaf wild oat, 18 inch wild mustard and 5 to 6 leaf wheat with clear sky, 10 to 12 mph NW wind, and 65F. The boot treatments (boot)were applied June 25 to boot/heading wild oat, 3 feet tall wild mustard, and boot stage wheat with clear sky, 10 to 18 mph S wind and 80 F. All treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with four replications. Experimental units were 10 by 24 ft. Control ratings were taken on July 20.

Treatment		Rate oz/A	Wheat Yield bu/A	- % Cntl - Wioa	Wimu	Stand counts plants/3ftsq Wht	Wioa	Wimu
Diclofop	21f	16	24	90	0	43	12	8
Diclofop	3-41f	20	19	92	0	29	29	13
Diclofop	51f	24	15	93	0	22	16	14
Diclofop	boot	32	12	92	16	29	16	12
MCPA-bee	21f	6	21	0	73	43	70	1
MCPA-bee	3-41f	6	25	20	98	68	44	0
MCPA-bee	51f	6	13	16	96	36	86	3
MCPA-bee	boot	6	9	18	89	23	20	9
Diclofop+Bromoxynil	21f	16+6	41	86	97	78	28	0
Diclofop+Bromoxynil	3-41f	20+6	33	88	86	64	24	6
Diclofop+Bromoxynil	51f	24+6	22	85	80	41	24	7
Diclofop+Bromoxynil	boot	32+6	13	89	88	29	13	11
Untreated check		0	15	0	0	25	37	10
Mean			20	59	56	41	32	7
High mean			41	93	98	78	86	14
Low mean			9	0	0	22	12	0
Coeff. of variation			28	23	29	45	75	64
LSD(1 Percent)			11	26	31	35	46	9
LSD(5 Percent)			8	20	23	26	34	7
No. of reps			4	4	4	4	4	4

Summary

Wild oat control of 85% or greater was oabtained with diclofop regardless of application time. Wild mustard control was 80% or greater with all treatments containing bromoxynil or MCPA except MCPA applied at the 2leaf stage. Wheat yields were highest when both wild oat and wild mustard were controlled prior to the 5 leaf stage. Wild oat tended to reduce wheat yield more than wild mustard; however, wild oat densities were higher than mustard densities.

Time of wild oat and wild mustard control in wheat, Fargo main station, 1984. 'Era' wheat was seeded on April 25 and the 2 leaf treatments were applied on May 18 to 1 to 2 leaf wheat and wild oat and 2 to 4 leaf wild mustard with mostly clear sky, 65 F, 30% relative humidity, and 10 to 12 mph W wind. The 3 to 4 leaf treatments were applied on May 29 to 3 leaf wheat and wild oat and 2 to 6 leaf wild mustard with clear sky, 68 F,20% relative humidity, and 5 to 10 mph S wind. The 5 leaf treatments were applied June 11 to 4 to 5 leaf wheat and wild oat and 1 to 6 inch wild mustard with cloudy sky, drizzle, 65 F, 100% relative humidity, and 5 to 10 mph NW wind. The boot treatments were applied June 22 to wheat and wild oat in the late joint to boot stage and 8 to 24 inch wild mustard with cloudy sky, 74 F, 60% relative humidity, and 5 to 10 mph W wind.All treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with four replications and experimental units were 10 by 24 ft. Control ratings were taken on July 23.

Treatment		Yield bu/A	-----% control----- Wioa	Wimu
Diclofop	2lf	37	98	0
Diclofop	3-4lf	24	95	0
Diclofop	5lf	31	96	0
Diclofop	boot	21	60	0
MCPA-bee	2lf	27	0	99
MCPA-bee	3-4lf	26	0	99
MCPA-bee	5lf	25	0	95
MCPA-bee	boot	20	0	95
Diclofop+Bromoxynil	2LF	43	95	83
Diclofop+Bromoxynil	3-4LF	31	97	90
Diclofop+Bromoxynil	5LF	28	96	99
Diclofop+Bromoxynil	boot	17	80	99
Untreated check		11	0	0
Mean		26	55	58
High mean		43	98	99
Low mean		11	0	0
Coeff. of variation		0	0	0
LSD(1 Percent)		0	0	0
LSD(5 Percent)		0	0	0
No. of reps		1	1	1

Summary

Wild oats control with diclofop decreased if application was delayed until the boot stage. Treatments containing MCPA or bromoxynil gave excellent wild mustard control regardless of application time. Wheat yields tended to be highest when both wild oats and wild mustard were removed prior to the 5 leaf stage. Lack of wild oats control tended to reduce wheat yield more than lack of wild mustard control.

Date of wheat seeding for wild oats control, Fargo 1984. Len wheat was seeded on all dates. Date 1 was seeded on May 2, Date 2 on May 15, and Date 3 on May 30. Bromoxynil plus MCPA at 6+6 oz/a was applied to Date 1 seeded wheat on June 13 and to Date 2 and 3 on June 26. Diclofop at 16 oz/a was applied to the Date 1 seeded wheat on May 25 and Date 2 and 3 on June 18.

Treatment	Rate oz/A	Wheat Yield bu/A	Wioa Cntl %	Estimate Wioa Pl/M2	Counts Wioa 1X3ft
Diclofop Date 1	20	41.7	82	37	23
Diclofop Date 2	20	41.5	92	3	38
Diclofop Date 3	20	45.7	97	2	3
Untreated check Date 1	0	21.0	0	220	70
Untreated check Date 2	0	31.0	75	51	22
Untreated check Date 3	0	23.4	73	35	21
Mean		34.0	70	58	29
High mean		45.7	97	220	70
Low mean		21.0	0	2	3
Coeff. of variation		28.8	20	70	69
LSD(1 Percent)		20.5	30	84	42
LSD(5 Percent)		14.8	21	61	30
No. of reps		4.0	4	4	4

Summary

Date of seeding did not directly influence yield of wheat with or without herbicides. Yields were nearly twice as high when with herbicide treatment regardless of date of seeding. The early seeded wheat had more wild oat then the late seed wheat regardless if herbicide treated. Wheat yield was similar with 220 estimated wild oat plants per square meter with early seeding and with 35 with late seeding, without diclofop treatment. Thus, the late wild oats was either more competitve or potential yield was lower with late seeding. The full potential of early seeding with herbicide treatment was not obtained because the diclofop did not give complete wild oat control. The highest wild oat control was with diclfop plus late seeding with the extra tillage for control of early emerged wild oat.

Influence of herbicides on wild oat seed production, Fargo 1984. Era wheat was seeded on May 4. Triallate was applied immediately after seeding and incorporated twice with a harrow into the top 1 to 1.5 inch of soil. The two-leaf treatments (2-lf) were applied on May 22 to 2 leaf wheat and wild oat with clear sky, 60F, and 15 to 17 mph W wind. The four-leaf treatment (4-lf) was applied on June 13 to 4 to 6 leaf wheat and wild oat with partly cloudy sky and 63F. The experimental design was a randomized complete block. Triallate was applied in 17 gpa, diclofop and difenzoquat were applied in 8.5gpa, and barban was applied in 4 gpa.

			Wheat				Wioa	
Treatment		Rate oz/A	bu/A	%sr	%ir	%cntl	pan. /3ft	Seed /pan.
Triallate	PEI	16	14.6	6	0	28	69	35
Barban	2-lf	6	17.5	0	0	61	75	25
Diclofop	2-lf	12	22.6	0	0	59	71	23
Difenzoquat	4-lf	12	36.7	3	25	85	31	32
Triallate+Barban	PEI+2-lf	16+6	41.8	10	0	81	28	33
Triallate+Diclofop	PEI+2-lf	16+12	40.6	9	3	90	30	16
Triallate+Difenzoquat	PEI+2-lf	6+12	14.7	18	8	95	3	20
Untreated check			6.2	0	0	0	206	12
Mean			24.3	6	4	62	64	24
High mean			41.8	18	25	95	206	35
Low mean			6.2	0	0	0	3	12
Coeff. of variation			15.9	81	69	14	55	28
LSD(1 Percent)			7.7	9	6	18	70	14
LSD(5 Percent)			5.7	7	4	13	52	10
No. of reps			4.0	4	4	4	4	4

Summary

Highest wheat yields were obtained with PEI triallate followed by postemergence barban or diclofop. Wild oat control of 90% or greater was obtained with PEI triallate followed by diclofop or difenzoquat. The number of wild oat panicles/3 ft sq. were lowest with triallate followed by difenzoquat.Wild oat seeds/panicle varied amoung treatments and appeared to relate to panicle density rather than herbicide treatment.

Ethalfluralin and Trifluralin for wild oat control in sunflower, Fargo 1984. Treatments were applied on May 17 with 60 F, 60% relative humidity, dry soil, and 20 to 25 mph NW wind and incorporated in the top 2 to 3 inches of soil (shallow) or in the top 3 to 4 inches of soil (deep) with a field cultivator. 'Seed Tec 315' sunflower was seeded immediately after herbicide incorporation. The experimental design was a split-plot with four replications and experimental units were 10 by 24 ft. Wild oat and wild mustard densities were heavy and control was rated July 5.

Treatment	Rate oz/A	Snfl %ir	-- % control -- Wioa	Wimu
Trifluralin PPI shallow	.75	0	28	0
Trifluralin PPI shallow	1	0	54	11
Trifluralin PPI shallow	1.25	0	36	0
Ethalfluralin PPI shallow	.75	0	53	23
Ethalfluralin PPI shallow	.94	0	43	8
Ethalfluralin PPI shallow	1.31	0	53	25
Triallate PPI shallow	1	0	59	0
Untreated check shallow	0	0	0	0
Trifluralin PPI deep	.75	0	26	10
Trifluralin PPI deep	1	0	51	10
Trifluralin PPI deep	1.25	0	44	8
Ethalfluralin PPI deep	.75	0	66	20
Ethalfluralin PPI deep	.94	0	74	23
Ethalfluralin PPI deep	1.31	0	76	41
Triallate PPI deep	1	0	63	5
Untreated check deep	0	0	0	0
Mean		0	45	11
High mean		0	76	41
Low mean		0	0	0
Coeff. of variation		0	24	69
LSD(1 Percent)		0	20	15
LSD(5 Percent)		0	15	11
No. of reps		4	4	4

Summary

None of the herbicide treatments caused any sunflower stand reduction or injury. Ethalfluralin provided better wild oat and wild mustard control than trifluralin regardless of incorporation depth, averaged over rates. Wild oat control with ethalfluralin was 50 and 72% when incorporated shallow and deep, respectively, averaged over rates. Ethalfluralin applied at 12 to 21 oz/A and incorporated deep provided the same level of wild oat control as triallate applied at 16 oz/A and incorporated deep. None of the herbicides provided adequate wild mustard control.

Wild oat control in sunflower, Fargo 1984. Seed Tec '315' sunflower was seeded on May 31 and treatments were applied on June 25 to 2 to 4 leaf sunflower and 2 to 5 leaf wild oat with 82 F, 40% relative humidity, cloudy sky, and 10 to 18 mph S wind. The experiment was a randomized complete block with 4 replications and experimental units were 10 by 24 ft. Wild oat density was moderate and control was rated on July 20.

Treatment	Rate lb/A	% cntl Wioa
Barban	16	61
Diclofop	12	74
Diclofop+PO	12+0.25G	79
Diclofop	16	86
Diclofop+PO	16+0.25G	96
Sethoxydim+PO	1.5+0.25G	95
Sethoxydim+PO	3+0.25G	99
Fluazifop+PO	1.5+1%	99
Fluazifop+PO	2+1%	99
Fluazifop+PO	3+1%	99
Fluazifop+PO	12+1%	99
Haloxyfop+PO	.75+0.25G	99
Haloxyfop+PO	1.5+0.25G	99
AC-222293	5	86
AC-222293	7.5	85
AC-222293	10	95
AC-222293	20	99
DPX-Y6202+PO	.5+0.25G	96
DPX-Y6202+PO	2+0.25G	99
Fenoxaprop+PO	1+0.25G	50
Fenoxaprop+PO	2+0.25G	94
Fenoxaprop+PO	4+0.25G	99
Clopropoxydim+PO	.5+0.25G	96
Clopropoxydim+PO	1+0.25G	99
Untreated check	0	0
Mean		87
High mean		99
Low mean		0
Coeff. of variation		7
LSD(1 Percent)		11
LSD(5 Percent)		9
No. of reps		4

Summary

None of the herbicides caused any sunflower stand reduction or injury. All rates of sethoxydim, fluazifop, haloxyfop, DPX-Y6202, and clopropoxydim gave excellent wild oat control. AC-222293 rates of 8 oz/A or greater were needed for over 90% wild oat control. Wild oat control with diclofop at 16 oz/A was increased from 86 to 96% when petroleum oil was added at 1 qt/A.

Wild oat control in sunflower, Minot 1984. Barban treatments were applied on June 20 to 1.5 to 2.5 leaf wild oat and 2 leaf sunflower. The other treatments were applied on July 2 with 65F and 5 to 10 mph W wind to 3 to 4 leaf wild oat and 6 leaf sunflower. The experimental design was a randomized complete block with 4 replications and experimental units were 10 by 21 ft. Ratings were taken on July 13 (1)and July 25 (2).

Treatment	Rate oz/A	Snfl %ir	--Percent control-- Wioa Rating 1	Wioa Rating 2
Barban	12	0	57	96
Diclofop	12	0	42	53
Diclofop+PO	12+.25G	0	39	50
Sethoxydim+PO	1.5+.25G	3	62	90
AC222293+Surf	8+.5%	0	49	91
AC222293+Surf	16+.5%	3	55	92
Fenoxaprop+PO	1.5+.25G	0	40	56
Haloxyfop+PO	1.5+.25G	0	84	99
Clopropoxydim+PO	1+.25G	0	78	96
Fluazifop+PO	2+.09%	0	79	98
Untreated check	0	0	0	0
Mean		0	53	74
High mean		3	84	99
Low mean		0	0	0
Coeff. of variation		445	17	11
LSD(1 Percent)		4	18	16
LSD(5 Percent)		3	13	12
No. of reps		4	4	4

Summary

Wild oat control increased for all treatments between rating 1 and 2. All treatments except diclofop and fenoxaprop gave excellent wild oat control.

Postemergence broadleaf weed control[1] in wheat, Fargo 1984. Era wheat was seeded on May 16. Postemergence (Post 1) treatments were applied to 5 leaf to jointing wheat, 2 to 6 inch tall wild mustard, 1 to 3 inch redroot pigweed and kochia, and 2 to 5 leaf yellow foxtail on June 26. Postemergence (Post 2) treatments were applied to jointing stage wheat on July 2. Wheat response and weed control ratings were on July 17. Yellow foxtail density was 20 plants per sq. ft. and wild mustard, kochia, and redroot pigweed at 1 plant per sq. ft..

			--Wheat---					
		Rate	Yield	%ir	--Percent	control--		
Treatment		oz/A	bu/A		Yeft	Wimu	Kocz	Rrpw
2,4-D-dma	Post1	4	59.8	4	0	98	76	84
2,4-D-dma	Post1	8	50.9	10	0	97	86	93
MCPA-dma	Post1	4	53.1	1	16	97	53	66
MCPA-dma	Post1	8	56.1	0	0	98	79	86
Dicamba+MCPA	Post1	1.5+4	51.0	19	3	97	91	96
Dicamba+2,4-D	Post1	1.5+4	48.4	23	5	99	98	97
Picloram+MCPA	Post1	0.25+4	48.0	16	0	99	45	92
Picloram+2,4-D	Post1	1+4	41.8	34	0	99	79	93
Dowco-290+2,4-D	Post1	1+4	52.1	4	0	99	54	81
Bromoxynil-UC	Post1	4	56.8	1	14	96	86	78
Brox&MCPA-UC	Post1	8	50.6	3	16	98	76	75
Bent&MCPA	Post1	12	51.6	0	0	99	68	84
Bent&MCPA+Poss	Post1	12+0.25G	55.5	3	5	99	92	93
Bent+2,4-D-dma+Poss	Post1	8+4+0.25G	54.0	4	0	99	73	86
Bent+Brox-UC+Poss	Post1	8+4+0.25G	49.3	4	31	99	91	87
Bent+MCP-dma+Cyan-L+Po	P1	8+4+1.6+.25G	45.8	1	0	96	78	83
EH-541	Post1	4	44.0	20	10	99	94	95
EH-540	Post1	4.8	53.3	21	11	98	96	95
EH-763	Post1	7.7	50.5	0	11	99	76	85
EH-786	Post1	7.7	52.5	6	0	99	71	90
DPX-M6+X77	Post1	.12+.25%	43.7	0	50	99	91	96
DPX-M6+X77	Post1	.25+.25%	52.6	5	63	98	91	95
DPX-M6+X77	Post1	.5+.25%	56.0	3	79	98	95	98
DPX-M6+X77	Post1	1+.25%	50.2	5	54	99	89	89
DPX-M6+X77	Post2	.12+.25%	56.0	3	30	96	73	75
DPX-M6+X77	Post2	.25+.25%	56.0	2	33	94	84	82
DPX-M6+X77	Post2	.50+.25%	51.1	3	49	85	78	76
DPX-M6+X77	Post2	1+.25%	47.8	3	45	97	81	90
Brox-RP	Post1	4	56.9	1	20	82	88	88
Brox&MCPA-RP	Post1	8	55.9	3	25	99	94	96
Brox-RP+Acif-RP	Post1	4+1	50.0	3	36	99	95	93
Brox-RP+Acif-RP	Post1	4+2	47.1	11	30	98	74	86
Brox-RP+Acif-RP	Post1	4+4	41.4	20	46	99	83	82
Untreated check			52.1	0	0	0	0	0
Mean			51.2	7	20	94	79	85
High mean			59.8	34	79	99	98	98
Low mean			41.4	0	0	0	0	0
Coeff. of variation			14.6	69	68	6	14	10
LSD(1 Percent)			13.8	9	25	10	20	16
LSD(5 Percent)			10.5	7	19	8	15	12
No. of reps			4.0	4	4	4	4	4

Summary

None of the treatments caused any wheat stand reduction. Injury to wheat was evident for treatments containing dicamba and picloram, probably because the advanced stage at treatment. All treatments controlled wild mustard. Several treatments were effective in controlling both redroot pigweed and kochia; dicamba with phenoxy herbicides, bentazon with MCPA and oil, EH-540, most DPX-M6316 treatments, bromoxynil with MCPA, and bromooxynil with acifluorfen.

Postemergence broadleaf weed control in wheat, Casselton, 1984. Era wheat was seeded on May 3. Treatments were applied to jointing stage wheat,flowering wild mustard,and 10 to 18 inch tall common lambsquarter on June 20.Treatments were applied late because rains prevented earlier application. Crop injury and weed control evaluations were on July 18. Wild mustard and common lambsquarter density were 1 plant per sq. ft.

		----Wheat---		-% control-	
Treatment	Rate oz/A	Yield bu/A	%ir	Wimu	Colq
MCPA-dma	4	61.9	2	99	99
2,4-D-dma	4	72.7	1	99	99
Dicamba+MCPA-dma	1.5+4	56.9	29	99	99
Picloram+MCPA-dma	0.25+4	62.8	29	97	99
Dowco-290+MCPA-dma	1+4	75.3	6	96	99
Brox-UC	4	69.7	0	87	97
Brox-UC&MCPA-UC	8	73.7	2	85	99
Bent&MCPA+Poss	12+0.25G	62.9	0	98	99
Bent+2,4-D-dma+Poss	8+4+0.25G	71.1	5	95	99
Bent+Brox-UC+Poss	8+4+0.25G	68.2	2	97	93
Bent+MCPA-dma+Cyan-L+Poss	8+4+1.6+.25G	52.0	10	97	99
VCS-438	8	54.8	3	69	33
VCS-438	16	40.2	23	71	81
Dicamba	2	46.6	30	87	91
Dicamba-K	2	45.0	34	93	96
PPG-1013 Residue	0.3	39.6	13	99	68
PPG-1013 Residue	0.6	33.4	29	99	82
PPG-1013+Brox-UC	0.3+4	49.4	12	97	94
PPG-1013+2,4-D-dma	0.3+4	57.0	6	99	99
R-40244+Dicamba	1+1	60.2	26	97	99
R-40244+Dicamba	1+1.5	66.3	0	92	81
R-40244+Dicamba	2+1	61.7	24	98	99
R-40244+Dicamba	2+1.5	46.9	28	99	99
R-40244+Brox-UC	1+2	61.7	3	88	99
R-40244+Brox-UC	2+2	62.6	1	95	99
R-40244+Brox-UC	2+4	50.3	9	99	99
Propanil+MCPA-bee	15+4	58.7	8	91	99
Propanil+MCPA-bee	18+4	51.1	10	95	99
Propanil+MCPA-bee	12+8	65.8	8	97	99
Untreated check	0	69.0	0	0	0
Mean		58.2	12	90	90
High mean		75.3	34	99	99
Low mean		33.4	0	0	0
Coeff. of variation		16.1	40	11	7
LSD(1 Percent)		17.4	9	18	11
LSD(5 Percent)		13.1	7	14	8
No. of reps		4.0	4	4	4

Summary

None of the treatments caused any wheat stand reduction. Treatments containing dicamba, picloram, PPG-1013, and USC-438 injured wheat. The injury to the wheat from some of the herbicides was probably bacause of the advanced stage at treatment. Rains prevented timely application. Most treatments were effective in controlling the weeds. The respective wheat injury, wild mustard control, and common lambsquarter control for extra treatment adjacent to the experiment were; EH-810 at 8 oz/A 26,99 and 99; EH 811 at 8 oz/A 18,99,and 99; EH-819 at 8oz/A 23,99,and 99.

Preemergence and postemergence broadleaf weed control in wheat and barley, Fargo 1984. Era wheat and Park barley were seeded and preemergence (PE) treatment applied on April 25. Postemergence treatments were applied to jointed wheat and barley, 1 to 18 inch tall wild mustard, and 1 to 3 inch kochia on June 13. Wild mustard density was more than 1 plant per sq. ft. and kochia density was variable and occurred only in two replications.

Treatment	oz/A	--Yield--- gms/44sqft Bar	Wht	Wht %ir	Bar %ir	--%cntl-- Wimu	Kocz
PPG-1013 PE	2.5	1068	584	1	1	30	0
PPG-1013 PE	3.2	1290	1118	0	1	61	30
PPG-1013 PE	6.5	1315	1070	0	6	81	40
R40244 PE	6	1259	1062	0	0	46	16
R40244 PE	8	1277	1143	0	5	58	19
Chloramben PE	64	0	1040	26	99	83	49
Pendimethalin PE	20	1687	1148	5	4	33	21
PPG-1013 Post	.3	911	860	14	23	97	39
PPG-1013 Post	.6	854	749	13	33	97	47
DPX-M6316+X-77 Post	.5+.25%	1328	1269	1	3	88	46
DPX-M6316+X-77 Post	1+.25%	1275	1114	8	8	97	46
Clsu+X-77 Post	.25+.25%	1367	1399	0	6	97	42
Untreated check	0	1108	971	0	0	0	0
Mean		1134	1040	5	14	67	30
High mean		1687	1399	26	99	97	49
Low mean		0	584	0	0	0	0
Coeff. of variation		35	26	97	45	27	81
LSD(1 Percent)		767	524	10	12	35	47
LSD(5 Percent)		573	392	7	9	26	35
No. of reps		4	4	4	4	4	4

Summary

None of the treatments reduced crop stand except chloramben which reduced barley stand. PPG-1013, DPX-M6316, and chlorsulfuron all controlled wild mustard and koshia. PPG-1013 preemergence was less injurious to barley than wheat. PPG-1013, DPX-M6316, and chlorsulfuron all controlled wild mustard and koshia. PPG-1013 preemergence was less injurious to wheat and barley than when postemergence, but 10 times higher rate was needed for similiar weed control.

Herbicide mixture for foxtail control, Fargo 1984. Era wheat was seeded on May 16. Treatments were applied to 5 to 6 leaf wheat, 2 to 4 leaf yellow foxtail, 2 to 4 leaf wild mustard and 1 inch kochia on June 21. Evaluation was on July 6. Kochia and wild mustard density was variable.

		--Wheat---				
		Yield		----% control-----		
Treatment	oz/A	bu/A	%ir	Yeft	Kocz	Wimu
Diclofop	8	48.5	0	69	0	0
Diclofop	16	45.6	3	81	0	0
Propanil	18	38.9	21	98	84	86
HOE-33171	1	40.9	27	89	20	19
HOE-33171+Poss	1+.25G	41.1	18	94	13	0
HOE-33171	2	25.4	58	98	16	0
HOE-33171+Poss	2+.25G	26.0	54	98	0	0
Propanil&MCPA	18	41.5	11	78	91	98
Propanil+MCPA	18+4	40.7	17	91	89	99
AC-222293+Diclofop	4.8+8	52.1	1	48	19	99
AC-222293+Propanil	4.8+18	42.6	17	78	84	99
AC-222293+Prnl&MCPA	4.8+18	42.6	12	92	74	99
AC-222293+HOE-33171	4.8+1	45.8	3	45	20	99
AC-222293+HOE-33171+Poss	4.8+1+.25G	51.7	3	65	38	99
AC-222293+HOE-33171	4.8+2	49.0	5	63	18	99
AC-222293+HOE-33171+Poss	4.8+2+.25G	44.0	4	67	20	97
AC-222293+Diclofop	9.6+6	53.3	4	50	33	99
AC-222293+Prnl	9.6+18	45.6	13	89	75	96
AC-222293+Prnl&MCPA	9.6+18	39.4	12	93	83	96
AC-222293+HOE-33171	9.6+1	52.0	1	45	30	99
AC-222293+HOE-33171+Poss	9.6+1+.25G	39.8	19	84	33	99
AC-222293+HOE-33171	9.6+2	47.5	4	56	38	97
AC-222293+HOE-33171+Poss	9.6+2+.25G	50.6	7	71	25	99
AC-222293	4.8	51.7	1	10	13	99
AC-222293	9.6	46.7	3	6	48	98
Diclofop+Bromoxynil	12+4	48.4	4	86	95	99
Untreated check	0	45.8	0	0	0	0
Mean		44.3	12	68	39	73
High mean		53.3	58	98	95	99
Low mean		25.4	0	0	0	0
Coeff. of variation		11.3	48	23	56	12
LSD(1 Percent)		9.2	11	29	41	16
LSD(5 Percent)		7.0	8	22	31	12
No. of reps		4.0	4	4	4	4

Summary

None of the treatments caused observable wheat stand reduction. AC-222293 in combination with HOE-33171 or diclofop generally gave less yellow foxtail control than when HOE-33171 or diclofop was applied alone. AC-222293 with propanil gave control of yellow foxtail and kochia. AC-222293, MCPA, bromoxynil and propanil all gave 85% or more wild mustard control. The foxtail emerged several weeds after the wheat. The wheat canopy may have partly prevented the spray from contacting the smaller foxtail.

AC-222293 and sethoxydim for foxtail control in wheat, Fargo 1984. Era wheat was seeded on May 16. Herbicides were applied to 5 leaf to jointing wheat, 2-4 leaf yellow foxtail and other weeds 1 to 3 inches tall on June 21. Injury to wheat and control of weeds was evaluated on July 17. Yellow foxtail was at 30 plants and wild mustard and kochia at 1 plant per square foot.

Treatment	Rate oz/A	---Wheat--- Yield bu/A	%ir	-Percent Yeft	Wimu	control- Kocz
Sethoxydim	.3	45.2	0	47	0	0
Sethoxydim	.7	42.3	7	60	0	0
Sethoxydim	1.5	29.8	54	92	23	0
Sethoxydim+Poss	.7+.25G	23.1	65	93	0	5
AC-222293+Sethoxydim	5+.3	46.8	1	51	98	28
AC-222293+Sethoxydim	5+.7	39.3	31	80	99	18
AC-222293+Sethoxydim	5+1.5	22.2	65	89	99	31
AC-222293+Sethoxydim	7.5+.3	48.2	0	49	99	17
AC-222293+Sethoxydim	7.5+.7	41.0	34	63	99	30
AC-222293+Sethoxydim	7.5+1.5	24.7	62	92	99	14
AC-222293+Seth+DM710	7.5+.3+.5%	45.4	5	59	99	19
AC-222293+Seth+DM710	7.5+.7+.5%	37.0	37	79	99	29
AC-222293+Seth+DM710	7.5+1.5+.5%	24.2	62	90	99	29
AC-222293+Seth+Poss	7.5+.3+.25G	42.0	29	63	99	28
AC-222293+Seth+Poss	7.5+.7+.25G	24.6	64	94	99	44
AC-222293+Seth+Poss	7.5+1.5+.25G	3.5	90	96	99	38
AC-222293+Seth+Po+DM	7.5+.3+.25G+.5%	43.8	19	60	99	23
AC-222293+Seth+Po+DM	7.5+.7+.25G+.5%	32.4	44	52	99	23
AC-222293+Seth+Po+DM	7.5+1.5+.25G+.5%	10.3	83	97	99	40
AC-222293+Sethoxydim	10+.3	48.2	3	65	99	14
AC-222293+Sethoxydim	10+.7	38.9	35	74	99	28
AC-222293+Sethoxydim	10+1.5	25.0	51	87	99	16
AC-222293	10	51.0	0	13	99	15
AC-222293+Seth+DM710 Post2	7.5+.7+.5%	40.3	38	74	99	14
AC-222293+Seth+Poss Post2	7.5+.7+.25G	26.2	53	82	98	41
Difenzoquat+Sethoxydim Post2	12+.7	34.4	41	64	3	0
Untreated check	0	50.9	0	0	0	0
Mean		34.8	36	69	78	20
High mean		51.0	90	97	99	44
Low mean		3.5	0	0	0	0
Coeff. of variation		15.4	21	19	11	87
LSD(1 Percent)		9.9	14	25	16	32
LSD(5 Percent)		7.5	11	19	12	24
No. of reps		4.0	4	4	4	4

Summary

None of the treatments caused an observable wheat stand reduction. Injury to wheat was high from treatments with sethoxydim at more than 0.3 oz/A. Sethoxydim at 0.3 oz/A did not give adequate yellow foxtail control. The foxtail in the experiment emerged more than a week after the wheat and was partly protected from treatment by the wheat canopy. AC-222293 effectively controlled wild mustard regardless of the rate or when applied with other herbicides or additives. Yields generally related to injury. The weeds probably were not competitive because of their late emergence relative to the wheat.

Weed control in wheat, Carrington 1984. Propanil+MCPA was applied to 2 to 4-leaf wheat on June 28 and the other treatments were to tillering wheat and 3 to 4 inch broadleaf weeds on July 6. The Butte wheat was seeded on June 12. Evaluation was on July 24. Weed density was 1 redroot pigweed and 1 common lambsquarter per ft. sq..

Treatment	Rate oz/A	-- Wheat -- %sr	%ir	-% control- Rrpw	Colq
MCPA	4	0	1	79	87
2,4-D	4	0	0	61	85
Dicamba+MCPA-dma	1.5+4	0	3	84	82
Dicamba+2,4-D-dma	1.5+4	0	5	98	99
Bentazon&MCPA	12	0	3	92	99
EH-541	4	0	3	63	89
Picloram+MCPA-dma	.25+4	0	1	84	90
Dowco-290+MCPA-dma	1+4	0	0	77	96
Bromoxynil&MCPA-UC	8	0	1	93	98
DPX-M6316+77	.5+.25%	0	0	91	74
Diclofop+Bromoxynil	12+4	0	0	88	99
Propanil+MCPA-bee	18+4	0	5	99	99
Untreated Check	0	0	0	0	0
Mean		0	2	78	84
High mean		0	5	99	99
Low mean		0	0	0	0
Coeff. of variation		0	158	15	11
LSD(1 Percent)		0	5	22	18
LSD(5 Percent)		0	4	17	14
No. of reps		4	4	4	4

Summary

None of the treatments cause any stand reduction or important injury to wheat. Bentazon + MCPA (8+4 oz/A), Propanil + MCPA, and dicamba + 2,4-D gave 95% or more control of the broadleaf weeds.

Weed control in wheat, Langdon 1984. Treatments were applied to 4 to 5 leaf Rolette durum, 2 to 4 leaf redroot pigweed, 2 to 6 leaf common mallow, and 2 leaf green foxtail on June 26. Evaluation was on July 27.

Treatment	Rate oz/A	-- Wheat -- %sr	%ir	----- Percent Grft	Coma	control ----- Kocz	Rrpw
MCPA	4	0	1	0	34	74	40
2,4-D	4	0	1	35	50	92	80
Dicamba+MCPA-dma	1.5+4	0	9	13	73	96	90
Dicamba+2,4-D-dma	1.5+4	0	19	5	66	84	90
Bentazon&MCPA	12	0	1	5	71	86	38
EH-541	4	0	4	23	43	80	53
Picloram+MCPA-dma	.25+4	0	4	0	43	39	80
Dowco-290+MCPA-dma	1+4	0	1	8	56	63	65
Bromoxynil&MCPA-UC	8	0	4	0	59	93	80
Chlorsulfuron+x77	.25+.25%	0	0	64	88	99	99
DPX-M6316+77	.5+.25%	0	0	0	79	98	95
Diclofop+Bromoxynil	12+4	0	0	18	35	69	45
Propanil+MCPA-bee	18+4	0	10	63	45	91	80
Untreated Check	0	0	0	0	0	0	0
Mean		0	4	17	53	76	67
High mean		0	19	64	88	99	99
Low mean		0	0	0	0	0	0
Coeff. of variation		0	133	138	42	25	38
LSD(1 Percent)		0	10	44	43	36	77
LSD(5 Percent)		0	7	33	32	27	55
No. of reps		4	4	4	4	4	2

Summary

Dicamba applied with 2,4-D caused slight injury to the wheat. Chlorsulfuron and DPX-M6316 were the only herbicides to give 79% or more common mallow control. Treatments with dicamba, bromoxynil, chlorsulfuron, DPX-M6316, and propanil were the most effective for kochia control.

Weed and barley control in wheat, Langdon 1984. Preplant herbicides applied; and roto tiller incorporated; Azure barley, Floyd durum, and tame oats seeded; preemergence incorporated herbicides applied and harrow incorporated; and preemergence herbicides applied on May 17. Species response evaluated on July 28.

Treatment		Rate lb/A	----Wheat---- %sr	%ir	----Percent Control----- Barl	Oat	Grft
Chloramben	PPI	.5	8	5	11	23	5
Chloramben	PPI	1	1	4	11	28	31
Chloramben	PPI	1.5	0	3	39	46	41
Chloramben	PPI	2	4	5	46	46	66
Clam+Tria	PPI	2+1	0	4	56	76	50
Trif+Tria	PPI	.5+1	0	0	16	80	71
Chloramben	PEI	2	0	0	19	36	41
Chloramben	PEI	1	3	3	14	25	43
Trif+Tria	PEI	.5+1	10	3	9	66	56
Clam+Tria	PEI	.5+	3	5	28	69	33
Chloramben	PE	2	0	0	25	23	35
Chloramben	PE	1	5	8	18	16	5
Clam+Pend	PE	2	5	3	30	43	89
No Control			5	3	8	11	0
Mean			3	3	23	42	40
High mean			10	8	56	80	89
Low mean			0	0	8	11	0
Coeff. of variation			291	224	69	46	62
LSD(1 Percent)			17	13	31	37	48
LSD(5 Percent)			13	10	23	27	36
No. of reps			4	4	4	4	4

Summary

Treatments with chloramben were more injurious to barley and oats than wheat. Wheat had acceptable tolerance to all the treatments. Trifluralin was less injurious than chloramben to wheat and barley when in combination with triallate.

Crop variety response to fall and spring applied chlorsulfuron, Langdon and Williston 1984. Chlorsulfuron was applied at 0.25 and 0.5 oz/A at Williston on October 12,1983 and at 0.18, 0.38 and 0.5 oz/A at Langdon on October 17, 1983. Drill strips of 43 HRS wheat, 26 durum, and 23 oat varieties were seeded across the treated soil on April 24, 1984 at Williston and drill strips of 4 HRS wheat, 8 durum, 2 flax, and 4 barley varieties were seeded across the treated soil on May 21, 1984 at Langdon. Chlorsulfuron was applied across all varieties on June 4 to 2.5 to 3 leaf small grains at Langdon. Only the Langdon data is presented in the following table.

Variety	------ Fall Clsu ------ 0.18 oz/A %ir	0.38 oz/A %ir	0.50 oz/A %ir	Spr Clsu 0.38 oz/A %ir	Check
Ward durum	0	0	0	0	0
Vic durum	0	0	8	7	0
D804 durum	2	2	7	2	0
D78127 durum	0	0	0	3	0
Medora durum	0	5	5	0	0
D793 durum	0	20	0	0	0
Lloyd durum	15	0	0	5	0
Cando durum	0	0	0	0	0
Butte Hard Red Spring Wheat	0	10	5	0	0
Alex Hard Red Spring Wheat	0	15	0	10	0
Len Hard Red Spring Wheat	0	0	0	0	0
Marshall Hard Red Spring Wheat	5	10	5	0	0
Dufferin flax	0	0	60	0	0
Flor flax	0	0	60	0	0
Azure barley	5	0	0	0	0
Morex barley	0	0	0	0	0
Robust barley	0	0	10	0	0
Hazen	0	0	10	10	0
Mean	1	3	9	2	0
High mean	15	20	60	10	0
Low mean	0	0	0	0	0
Coeff. of variation	46	20	16	98	0
LSD(1 Percent)	2	2	3	5	0
LSD(5 Percent)	1	1	2	3	0
No. of reps	3	3	3	3	3

Summary

Fall or spring applied chlorsulfuron did not injure durum, HRS wheat, oats or barley varieties at Langdon or Williston. Chlorsulfuron did not reduce the yield of Ward, Vic, D804 and D78127 durum at Langdon. These data indicate that HRS wheat, durum, oats and barley varieties do not respond differently to chlorsulfuron applied at 0.5 oz/A or less. Both varieties were injured 60% when seeded into soil treated with chlorsulfuron at 0.38 oz/A in the fall at Langdon.

Marshall and Len wheat response to picloram, Minot 1984. Wheat was seeded on May 24. Two to four leaf treatments were applied on June 18, 5 leaf treatments were to 5 leaf to jointing wheat on June 28, and early boot stage treatments were on July 6. Temperatures were 65 to 70 F and humidity 50 to 65% on all three dates. Weed densities were low and plots were 10 by 16 ft.

			Marshall					
Trtmt [1]	Rate	Stage	% Injury July 25	% Injury Aug 27	July Head Date	Test Wt lb/bu	Hght in	Yield bu/A
Picl + 2,4-DA	.25+4	2-4lf	10	11	19	58	26	41
Picl + 2,4-DA	.375+6	2-4lf	7	11	18	59	25	49
Picl + 2,4-DA	.75+12	2-4lf	16	18	19	58	25	41
Picl + MCPAE	.25+4	2-4lf	11	11	19	58	25	44
Picl + MCPAE	.375+6	2-4lf	17	11	18	58	26	34
Picl + MCPAE	.74+12	2-4lf	17	20	19	59	25	45
Picl + 2,4-DA	.375+4	5lf	27	31	20	59	22	35
Picl + 2,4-DA	.75+6	5lf	30	36	20	59	22	38
Picl + 2,4-DA	1.5+12	5lf	27	36	20	59	23	29
Picl + MCPAE	.375+4	5lf	23	33	20	59	23	31
Picl + MCPAE	.75+6	5lf	31	40	20	59	23	45
Picl + MCPAE	1.5+12	5lf	37	55	20	59	21	26
Brox + MCPA	8+8	2-4lf	8	7	18	59	28	44
Brox + MCPA	8+8	5lf	2	10	18	58	26	41
Check			0	5	17	58	25	44
Picl + 2,4-DA	.25+4	EBoot	5	23	19	58	23	43
Picl + 2,4-DA	.375+6	EBoot	1	20	18	59	24	33
Picl + 2,4-DA	.75+12	EBoot	7	30	19	59	22	32
Picl + MCPAE	.25+4	EBoot	1	28	18	59	23	43
Picl + MCPAE	.375+6	EBoot	7	32	19	59	22	38
Picl + MCPAE	.75+12	EBoot	17	48	20	59	21	30
High Mean			37	55	20	59	28	49
Low Mean			0	5	17	58	21	26
Exp Mean			14	24	19	59	24	38
C.V. %			39	28	4	2	9	24
LSD 5%			8	10	1	NS	3	13
LSD 1%			10	13	1	3	4	17
# of Reps			4	4	4	4	4	4

Trtmt[1]	Rate	Stage	% Injury July 25	% Injury Aug 27	Len July Head Date	Test Wt lb/bu	Hght in	Yield bu/A
Picl + 2,4-DA	.25+4	2-4lf	1	6	17	59	41	30
Picl + 2,4-DA	.375+6	2-4lf	3	8	16	59	48	30
Picl + 2,4-DA	.75+12	2-4lf	5	11	18	59	40	29
Picl + MCPAE	.25+4	2-4lf	2	11	16	59	43	29
Picl + MCPAE	.375+6	2-4lf	11	12	17	59	40	28
Picl + MCPAE	.74+12	2-4lf	17	17	18	58	37	27
Picl + 2,4-DA	.375+4	5lf	25	27	18	59	39	26
Picl + 2,4-DA	.75+6	5lf	26	23	19	60	41	26
Picl + 2,4-DA	1.5+12	5lf	30	31	19	60	41	26
Picl + MCPAE	.375+4	5lf	25	31	19	59	35	25
Picl + MCPAE	.75+6	5lf	31	22	19	59	43	25
Picl + MCPAE	1.5+12	5lf	33	37	20	60	32	24
Bronate	8+8	2-4lf	6	8	17	59	37	29
Bronate	8+8	5lf	7	12	16	59	41	28
Check			0	6	15	59	42	29
Picl + 2,4-DA	.25+4	EBoot	5	10	15	58	37	29
Picl + 2,4-DA	.375+6	EBoot	1	17	16	59	36	29
Picl + 2,4-DA	.75+12	EBoot	7	13	15	59	36	29
Picl + MCPAE	.25+4	EBoot	1	16	16	59	40	29
Picl + MCPAE	.375+6	EBoot	7	15	15	59	34	29
Picl + MCPAE	.75+12	EBoot	17	21	16	59	36	27
High Mean			33	37	20	60	48	30
Low Mean			0	6	15	58	32	24
Exp Mean			12	17	17	59	39	28
C.V. %			46	30	3	1	16	6
LSD 5%			8	7	.9	.85	NS	2
LSD 1%			11	9	1	1		3
# of Reps			4	4	4	4	4	4

[1] A = formula 40 2,4-D amine and E = ester

Summary

Picloram at 0.37 oz/A or more applied at the 5 leaf stage or later, generally reduced Marshall wheat yield, but not Len wheat. However, the Len wheat yield was more variable than that of Marshall. Yield reductions related to injury ratings. Wheat test weight was not influenced by treatments. Picloram applied at the later stages causes a reduction in Marshall wheat plant height.

Postemergence weed control in flax. Clark flax was seeded to a Fargo silty clay soil with 8pH and 5% organic matter, May 16, 1984 Fargo ND. Treatments were applied to 6 to 8 inch tall flax, 2 to 6 inch yellow foxtail, and 2 to 4 leaf redroot pigweed on June 21 with 70 F, and 100% relative humidity. Soil conditions were moist and a trace of rain occurred immediately after treatment. The only other rain after treatment was a trace to 0.08 inches for each of 3 days after treatment. Weed control and crop injury was evaluated visually on July 13. The yellow foxtail was at 30 and redroot pigweed at 1 plant per sq. ft..

		----Flax-----			
	Rate	Yield	%ir	-% control-	
Treatment	oz/A	bu/A		Yeft	Rrpw
MCPA-DMA+Sethoxydim+Poss	4+3+.25G	20.4	4	93	19
MCPA-dma+Dalapon	4+12	16.1	1	36	6
MCPA-bee+Sethoxydim+Poss	4+3+.25G	23.3	4	93	48
MCPA-bee+Sethoxydim+Poss	8+3+.25G	20.1	5	94	63
MCPA-dma+Sethoxydim+Poss	4+1.5+.25G	15.2	10	88	29
2-4-D-dma+Sethoxydim+Poss	4+3+.25G	20.9	9	85	30
2-4-D-bee+Sethoxydim+Poss	4+3+.25G	18.2	36	89	64
Bromoxynil+Sethoxydim	4+1.5	22.2	0	50	72
Brox-UC+Sethoxydim+Poss	4+1.5+.25G	20.7	3	83	71
Brox-UC+Sethoxydim+Poss	4+3+.25G	21.0	7	88	39
Picloram+MCPA-dma	.25+4	0.	8	9	19
Picl+MCPA-bee+Seth+Poss	.25+4+3+.25G	21.9	5	88	59
MCPA-dma+Fluazifop+Poss	4+1.5+1%	17.1	1	75	14
MCPA-dma+Fluazifop+Poss	4+3+1%	14.3	1	74	33
MCPA-dma+Fluazifop+Poss	4+3+.25G	17.7	3	87	33
MCPA-bee+Fluazifop-2+Poss	4+3+.25G	17.4	5	84	48
Diclofop+Bromoxynil+Poss	16+4+.25G	15.9	4	68	65
Diclofop+Bromoxynil	16+4	13.6	10	76	50
Diclofop+Bromoxynil+Poss	8+4+.25G	15.0	5	53	29
Diclofop+Bromoxynil	8+4	16.8	0	58	54
Fluazifop-2+Poss	3+.25G	15.1	0	86	10
Sethoxydim+Poss	3+.25G	19.8	0	87	13
Propanil	20	18.9	9	51	58
Propanil+MCPA	20+4	15.2	10	54	64
Propanil+Sethoxydim+Poss	20+3+.25G	21.8	8	88	55
Propanil+Sethoxydim	20+3	19.5	5	95	76
Untreated check	0	18.4	0	0	0
Mean		17.6	6	71	41
High mean		23.3	36	95	76
Low mean		0.	0	0	0
Coeff. of variation		16.9	105	12	40
LSD(1 Percent)		5.5	11	16	31
LSD(5 Percent)		4.2	8	12	23
No. of reps		4.0	4	4	4

Summary

None of the treatments caused any flax stand reductions. Kochia infectation was variable, but prevented harvest of some plots, (0 yields). Observations indicated that the treatments with propanil controlled kochia,but did not injure volunteer sunflower. 2,4-D butoxy ether ester applied with oil and sethoxydim caused 36% injury to flax. The ester of 2,4-D or MCPA was more effective than amine in controlling redroot pigweed. MCPA applied with fluazifop generally reduced yellow foxtail control. Fluazifop with 1qt/A petroleum oil (Poss) tend to give higher yellow foxtail control than when with 1% oil.

Weed control in flax, Langdon 1984. Flor flax was treated on June 22. Flax was 4 to 6 and weeds were less than 6 inches tall at treatment. Crop response and weed control was evaluated on July 28. Kocia stand was sparse and variable.

Treatment	Rate oz/A	Yield bu/A	--Wht--- %sr	%ir	---% Wioa	control-- Kocz	Wibu
MCPA-dma+Dalapon	4+12	7.2	0	0	8	28	20
MCPA-dma+Picl+Seth+PO	4+.25+3+.25G	7.3	0	0	81	44	33
MCPA-dma+Sethoxydim+PO	4+3+.25G	8.8	0	3	92	51	21
MCPA-bee+Sethoxydim+PO	4+3+.25G	8.8	0	1	96	15	23
MCPA-bee+Sethoxydim+PO	4+1.5+.25G	8.6	0	1	88	58	33
Bromoxynil+Sethoxydim+PO	4+3+.25G	9.1	0	4	97	86	88
Bromoxynil+Sethoxydim	4+3	9.6	0	3	89	95	87
Bromoxynil+Fluazifop+PO	4+3+1%	7.1	0	1	90	84	83
Bromoxynil+Diclofop	4+16	9.2	0	3	72	92	84
Propanil+Sethoxydim+PO	16+3+.25G	8.2	0	3	58	71	66
Propanil+MCPA-bee	16+4	6.5	0	1	20	77	82
Propanil	16	7.0	0	1	3	55	61
Untreated check	0	6.5	0	0	0	0	0
Mean		8.0	0	2	61	58	52
High mean		9.6	0	4	97	95	88
Low mean		6.5	0	0	0	0	0
Coeff. of variation		17.1	0	195	18	41	36
LSD(1 Percent)		2.6	0	6	21	46	36
LSD(5 Percent)		2.0	0	4	15	34	27
No. of reps		4.0	4	4	4	4	4

Summary

None of the treatments caused important injury to flax.The bromoxynil combinations with sethoxydim gave the most effective control of the species present. Propanil tended to antagonize wild oat control with sethoxydim.

Weed control in flax, Minot 84. Flor flax was treated with the herbicides on June 20. Weed density was sparse. Evaluation was on July 13.

Treatment	Rate oz/A	Yield	%cntl Prpw	Flax %ir
MCPA-dma+Dalapon	4+12	12	59	1
MCPA-dma+Picl+Seth+PO	4+.25+3+.25G	12	68	14
MCPA-dma+Seth+PO	4+3+.25G	12	66	2
MCPA-bee+Seth+PO	4+3+.25G	14	58	1
MCPA-bee+Seth+PO	4+1.5+.25G	14	39	0
Bromoxynil+Seth+PO	4+3+.25G	13	35	1
Bromoxynil+Sethoxydim	4+3	15	73	1
Bromoxynil+Fluazifop+PO	4+3+1%	14	73	3
Bromoxynil+Diclofop	4+16	14	62	1
Propanil+Seth+PO	16+3+.25G	13	68	1
Propanil+MCPA-bee	16+4	14	91	3
Propanil	16	13	73	1
Untreated check	0	11	0	0
Mean		13	59	2
High mean		15	91	14
Low mean		11	0	0
Coeff. of variation		13	34	94
LSD(1 Percent)		3	38	4
LSD(5 Percent)		2	29	3
No. of reps		4	4	4

Summary

None of the treatments caused any flax stand reduction. Weed density was low and variable making evaluation difficult. Propanil with MCPA appeared as the most effective herbicide treatment for redroot pigweed control. Picloram applied with MCPA, sethoxydim and petroleum oil caused slight injury to flax.

Weed control in flax, Williston 1984. Culbert 79 flax was seeded on May 4 to soil with 6.8 pH, 2.1% organic matter and which was fallow in 1983 and fertilized with 50 lb/A nitrogen. Treatments were applied to 1 to 2 inch flax, 3-leaf wild oats and volunteer grain, and other weeds less than 2 inches tall on June 4 with 60F and 68% relative humidity. Weed densities at the July evaluation were dense wild oats and volunteer grain, moderate Russian thistle, and light for the other weed species. Harvest was on August 16. Early drought caused irregular flax emergence.

		—— Flax ——				—Percent				control—		
Treatment	Rate	Yield bu/A	Ht cm	%sr	%ir	Gr ft	Wo oa	Vo gr	Ru th	Wi oa	Co lq	Rr pw
MCPA-dma+Dalapon	4+12	1.7	44	6	47	69	0	60	30	90	36	53
MCPA-dma+Picl+Seth+Po	4+.25+3+.25G	3.8	47	11	53	91	93	84	85	91	98	93
MCPA-dma+Seth+Po	4+3+.25G	3.8	48	1	51	95	95	90	28	98	56	63
MCPA-bee+Seth+Po	4+3+.25G	3.8	43	0	51	96	98	94	18	96	65	40
MCPA-bee+Seth+Po	4+1.5+.25G	2.7	44	0	51	91	91	84	19	96	80	80
Bromoxynil+Seth+Po	4+3+.25G	5.5	48	0	53	96	96	91	75	69	70	43
Bromoxynil+Seth	4+3	4.9	49	0	53	91	87	85	78	63	66	60
Bromoxynil+Fluazifop+Po	4+3+1%	5.4	46	3	52	94	96	99	74	59	36	57
Bromoxynil+Diclofop	4+16	3.6	46	4	54	59	95	0	79	79	70	57
Propanil+Sethoxydim+Po	16+3+.25G	2.1	43	16	51	94	94	70	0	53	73	65
Propanil+MCPA-bee	16+4	1.5	41	4	52	25	0	0	34	99	94	92
Propanil	16	1.6	44	4	51	0	0	0	13	53	63	38
Untreated check		1.7	45	0	51	0	0	0	0	0	0	0
High mean		5.5	49	16	54	96	98	99	85	99	98	94
Low mean		1.5	41	0	48	0	0	0	0	0	0	0
Exp mean		3.2	45	4	52	69	65	58	41	73	62	57
C.V. %		26.2	7	151		17	9	17	28	13	33	34
LSD 5%		1.2	4	8		17	8	14	16	14	29	33
LSD 1%		1.6	NS	11		22	11	19	22	18	39	45
# of reps		4	4	4	1	4	4	4	4	4	4	3

Block	Yield	pH	%ir	wt	Gf	Wo	Vg	Rt	Wm	Co	Rr
1	2.6	43	3	52	68	62	58	35	69	58	0
2	4.0	46	2	0	69	66	61	46	74	64	0
3	3.6	45	5	0	71	65	58	41	75	52	49
4	2.8	46	5	0	70	66	56	42	72	73	65
F-trt	11.5	2	3	0	41264		68	33	35	7	5

Summary

None of the treatments caused any flax stand reduction. Propanil or picloram in combination with other herbicides increased redroot pigweed and common lambsquarter control. Sethoxydim and fluazifop in treatment gave effective control of grass species. Treatment with bromoxynil or picloram tended to give the highest Russian thistle control.

Preemergence R-40244 for weed control in sunflower, Casselton 1984. Preplant treatments were applied and field cultivator plus harrow incorporated, Seed Tech 315 sunflower seeded, and preemergence treatments applied on May 14. Postemergence sethoxydim was applied to 6 leaf sunflower, and 2 to 4 leaf yellow foxtail on June 25. Evaluation was on July 3.

Treatment		Rate oz/A	Yield lb/A	--Snfl-- %sr	%ir	--% control--- Wimu	Colq	Yeft
Pend+R-40244	PPI	20+8	2173	1	3	78	78	93
EPTC+R-40244	PPI	32+8	2190	0	1	89	84	94
EPTC+R-40244	PPI	48+8	1988	0	0	94	92	94
Etha+R-40244	PPI	15+8	2031	1	3	79	88	96
Trif+R-40244	PPI	16+8	2221	0	0	89	94	97
Trif/Clam-W	PPI	16+29	1917	5	6	52	89	98
EPTC/R-40244	PPI PE	32+4	2122	1	1	90	87	95
EPTC/R-40244	PPI PE	32+6	2251	0	1	98	98	99
EPTC/R-40244	PPI PE	32+8	2118	1	3	99	98	96
Trif/R-40244	PPI PE	16+4	2119	0	1	95	95	96
Trif/R-40244	PPI PE	16+6	2396	1	0	97	99	97
Trif/R-40244	PPI PE	16+8	2356	0	4	99	99	97
Trif/Clam-W	PPI PE	16+29	1559	0	0	47	84	97
Etha/R-40244	PPI PE	15+6	2054	1	0	99	99	97
Alachlor+R-40244	PE	48+6	2128	0	25	97	92	96
Pend+R-40244	PE	20+4	2324	0	0	93	91	88
Pend+R-40244	PE	20+6	2325	0	0	97	95	82
Pend+R-40244	PE	20+8	1948	1	0	99	94	91
R-40244/Seth+Poss	PE P	4+3+.25G	2376	1	5	78	47	94
R-40244/Seth+Poss	PE P	6+3+.25G	2250	0	4	97	93	98
R-40244/Seth+Poss	PE P	8+3+.25G	2483	1	0	99	96	99
EPTC	PPI	32	1554	0	0	31	9	93
R-40244	PE	8	2345	0	0	99	91	74
Pendimethalin	PE	20	1654	0	0	31	73	84
Ethalfluralin	PPI	15	1928	0	1	37	90	97
Untreated check		0	1588	0	0	0	0	0
Weedfree		0	1673	0	0	0	0	0
Mean			2077	1	2	76	80	87
High mean			2483	5	25	99	99	99
Low mean			1554	0	0	0	0	0
Coeff. of variation			15	399	462	14	9	6
LSD(1 Percent)			575	4	18	20	14	9
LSD(5 Percent)			435	3	14	15	11	7
No. of reps			4	4	4	4	4	4

Summary

None of the treatments caused important injury to sunflower stand reducton. R-40244 when surface applied generally gave higher wild mustard control than when soil incorporated. R-40244 preemergence followed by sethoxydim postemergence gave good control of all weeds on the experiments. R-40294 did not give consistant control of wild mustard or common lambsquarter. Yield of the weedfree was low because, hand weeding was not until late June when weeds were well established. Yield generally related to wild mustard control.

Preemergence weed control in sunflower, Fargo, 1984. Preplant incorporated (PPI) treatments were incorporated 3 inches deep with a field cultivator plus harrow twice and Seed Tec 315 sunflower seeded on May 17 with 70F, 50% RH, and west wind 15-25mph. Preemergence treatments were applied on May 18. The trifluralin + prometryn PPI may not have been applied at the full rate because of physical incompatibility which plugged the screens. Evaluation was on July 5 with weed density for yellow foxtail variable, wild mustard 1/sq. meter, kochia 10/sq. meter and redroot pigweed 1-10/sq. meter.

Treatment		Rate oz/A	Yield lb/A	Sfl %ir	--Percent control- Yft	Wmu	Kocz	Rrpw
EPTC	PPI	48	571	1	89	23	28	38
Trifluralin	PPI	16	722	0	97	9	86	94
Ethofumesate	PPI	15	570	1	45	18	15	23
Pendimethalin	PPI	20	650	0	85	29	68	85
Trifluralin+Clam-W	PPI	16+29	1079	3	96	57	94	96
Trif+Clam-W Clam-W	PPI+PE	16+22+22	876	1	98	68	92	99
Trifluralin+Clam-W	PPI	16+44	1180	3	99	80	95	99
Trifluralin+Prometryn	PPI	16+32	1023	3	98	91	97	97
Prometryn	PPI	32	775	1	51	66	55	18
Prodiamine	PPI	12	1089	0	97	72	94	97
SD-95481	PPI	19	903	8	97	74	86	84
SD-95481+R-40244	PPI	19+8	893	1	95	89	89	88
Ethofumesate+Clam-W	PPI	15+29	537	5	67	33	65	72
EPTC+Clam-W	PPI	48+29	947	3	94	47	66	70
Pendimethalin+Clam-W	PPI	20+29	733	3	96	45	85	95
Metolachlor	PE	40	482	0	90	29	18	77
Alachlor	PE	40	448	1	74	36	21	81
SD-95481	PE	19	578	1	84	23	15	14
SD-95481	PE	22	650	3	82	28	29	0
Cyanazine-L	PE	32	635	6	76	96	93	38
Prometryn	PE	32	458	3	45	55	52	38
Prometryn	PE	48	735	4	71	86	76	83
Prometryn	PE	64	543	0	93	88	74	77
Untreated check		0	442	0	0	0	0	0
Weed free check		0	891	0	0	0	0	0
Mean			736	2	77	49	60	62
High mean			1180	8	99	96	97	99
Low mean			442	0	0	0	0	0
Coeff. of variation			36	162	23	41	23	21
LSD(1 Percent)			492	6	32	37	26	24
LSD(5 Percent)			372	4	24	28	19	18
No. of reps			4	4	4	4	4	4

Summary

None of the treatments caused any sunflower stand reduction.Prometryn, cyanazine, and R-40244 gave 85% or more wild mustard control without important injury to sunflower. The kochia and redroot pigweed control with PPI SD-95481 is not understood. Kochia control was highest with treatments which contained R-40244, trifluralin or prodiamine. Yield generally related to weed control. Sunflowers were not postemergence cultivated. The yield of the weedfree sunflowers were lower than for some wtih herbicide treatment because of late weeding.

Postemergence broadleaf weed control in sunflower, Casselton 1984. Seed tech 315 sunflower was seeded on May 14. S1 treatments were to 6 to 8 leaf sunflower, 2 to 4 leaf wild mustard,4 leaf green foxtail, and 2 leaf common lambsquarter on June 20. S2 treatments were to 18 inch sunflower 4 leaf to bloom stage wild mustard, and 2 to 4 inch common lambsquarter on June 29. Evaluation was on July 18.

Treatment		Rate oz/A	---Snfl---- lb/A	%ir	----% control--- Yeft	Wimu	Colq
Desmedipham	S1	6	1409	16	17	93	88
Acifluorfen-RH	S1	2	828	37	8	99	5
Acifluorfen-RH	S1	3	323	61	33	99	10
Benazolin+Poss	S1	4+.25G	1081	19	0	69	93
Benazolin+Poss	S1	6+.25G	607	38	0	77	99
Benazolin+Acifluorfen	S1	4+2	749	39	20	99	97
Benazolin+Desmedipham	S1	4+6	1509	13	15	96	98
AC-222293	S1	1.2	1908	0	0	81	0
AC-222293	S1	2.4	1831	0	0	92	0
AC-222293	S1	4.8	1554	0	0	97	12
AC-222293+Benazolin+Poss	S1	4.8+4+.25G	667	30	10	98	98
Desmedipham	S2	6	1311	8	0	33	0
Acifluorfen-RH	S2	2	1584	2	0	78	5
Acifluorfen-RH	S2	3	1418	10	0	83	0
Benazolin+Poss	S2	4+.25G	1473	8	0	72	93
Benazolin+Poss	S2	6+.25G	991	18	0	85	98
Benazolin+Acifluorfen	S2	4+2	1675	5	0	85	95
Benazolin+Desmedipham	S2	4+6	1197	10	5	73	98
AC-222293	S2	1.2	1532	0	0	45	0
AC-222293	S2	2.4	1259	0	0	67	0
AC-222293	S2	4.8	1426	0	2	65	0
AC-222293+Bena+Poss	S2	4.8+4+.25G	971	10	0	82	94
Untreated check		0	1146	0	0	0	0
Weed free check		0	1638	0	99	99	99
Mean			1254	14	9	78	49
High mean			1908	61	99	99	99
Low mean			323	0	0	0	0
Coeff. of variation			19	35	99	13	13
LSD(1 Percent)			523	10	19	22	14
LSD(5 Percent)			393	8	14	16	10
No. of reps			3	3	3	3	3

Summary

Acifluorfen caused severe injury to sunflower at the early growth stage. The injury may have been enhanced by the very wet soil conditions prior to and at treatments. Desmedipham at the early application controlled wild mustard and common lambsquarter without important injury to sunflower. Benazolin was more effective in controlling commonlambsquarter than wild mustard and caused moderate injury to sunflower. AC-222293 gave good control of wild mustard at the early stage without injury to sunflower. Sunflower yield reflected weed control and injury from the herbicides.

Postemergence grass and broadleaf weed control in sunflower, Casselton 1984. Seed tech 315 sunflower was seeded on May 14. Treatments applied to 6 to 8 leaf sunflower, 2 to 4 leaf wild mustard (some 6 inches tall), and other weeds 2 inches tall on June 20 with 80F,60% relative humidity, sunny sky, and wet soil conditions. Evaluations were on July 18. Weed densities were: yellow foxtail 30, wild mustard 5, and common lambsquarter 5 plants per sq. ft..

Treatment	Rate oz/A	Yield	Snfl %ir	---% control---- Yeft	Wimu	Colq
AC222293	1.2	35.7	2	3	76	10
AC222293	2.4	28.4	0	0	80	0
AC222293	4.8	35.8	2	0	99	37
AC222293+Seth+PO	1.2+3+.25G	32.8	0	95	75	18
AC222293+Seth+PO	2.4+3+.25G	39.9	2	97	96	17
AC222293+Seth+PO	4.8+3+.25G	39.9	3	95	99	5
AC222293+Seth+PO	9.6+1.5+.25G	37.1	0	96	99	13
Benazolin+Seth+PO	7.2+3+.25G	28.1	23	93	56	90
AC222293+Fluazifop+PO	4.8+3+.25G	42.4	7	92	98	0
Sethoxydim+POSS	1.5+.25G	20.7	0	98	0	0
Sethoxydim+POSS	8+.25G	22.9	0	98	0	0
Sethoxydim	8	28.6	0	98	0	0
PO	.25G	23.9	0	0	0	0
AC222293+DPX-Y6202+PO	4.8+1+.25G	36.8	10	93	93	15
DPX-Y6202+PO	1+.25G	31.6	8	98	0	0
AC222293+Haloxyfop+PO	9.6+1+.25G	30.6	5	40	96	8
Haloxyfop+PO	1+.25G	27.4	0	96	0	0
Flua+PO/Flua+PO P/P14	6+1%+6+1%	19.8	20	99	0	0
Untreated weed free	0	39.1	0	66	66	66
Untreated	0	21.9	0	33	33	33
Mean		31.2	4	69	53	16
High mean		42.4	23	99	99	90
Low mean		19.8	0	0	0	0
Coeff. of variation		21.2	101	27	36	142
LSD(1 Percent)		14.6	9	41	42	49
LSD(5 Percent)		10.9	7	31	32	37
No. of reps		3.0	3	3	3	3

Summary

AC-222293 at 4 oz/A applied alone or in combination with various herbicides for postemergence grass weed control gave more than 90% wild mustard control without important injury to sunflower. AC-222293 at 4 oz/A did not reduce yellow foxtail control from sethoxydim, fluazifop,or DPX-Y6202. However, DXP-Y6202 control of yellow foxtail was reduced by AC-222293 at 8oz/A. Common lambsquarter was controlled only by benazolin which caused moderate injury to sunflowers.

Weed control in sunflower, Williston 1984. Preplant treatments were applied and incorporated once with a Glenco and a Multiweeder, and Cargill 204 sunflower were seeded on May 23. Preemergence treatment were applied on May 25. The sunflower were seeded at 18000 seeds/A in 30 inch spaced rows to soil fallowed in 1983, fertilized with 50 lb/A nitrogen, and with 6.8 pH and 2.1% organic matter. Postemergence treatments were to 4-leaf sunflower, weeds less than 1 inch, except for 1 to 4 inch Russian thistle and 5-leaf wild oats and volunteer wheat (Vogr). Weed densities at the July evaluation were dense volunteer wheat and Russian thistle, moderate wild oats and wild mustard, and light for the other weeds.

			---Percent control---							Snfl	
Treatment		Rate oz/A	Gr ft	Wi oa	Vo gr	Ru th	Wi mu	Co lq	Rr pw	% sr	% ir
EPTC+Clam	PPI	40+29	99	98	93	79	88	96	91	0	0
Trifluralin+Clam	PPI	12+29	97	94	65	76	78	91	91	0	0
Pendimethalin+Clam	PPI	16+29	92	83	63	74	77	93	93	0	0
Ethafluralin+Clam	PPI	12+29	97	97	84	89	75	92	93	0	0
Trifluralin+Fluorochlor	PPI	12+8	96	91	71	63	90	89	86	0	0
Trifluralin+Fluorochlor	PPI+PE	12+8	97	95	66	91	99	98	98	0	0
Trifluralin+Prometryn	PPI	12+32	96	88	53	58	19	91	84	0	6
Prometryn	PE	48	0	0	0	89	94	92	79	0	17
Trifluralin+Desmed	PPI+P	12+6	96	89	60	53	26	94	94	3	11
Trifluralin+Acifluor	PPI+PP	12+2	96	90	59	65	65	95	91	0	3
Trifluralin+Benazolin+Po	PPI	12+6+.25G	95	94	60	55	41	88	84	5	0
Trifluralin+AC-222293	PPI+P	12+4	95	96	40	71	97	86	85	0	0
Fluorochloridone+Seth+Po	PE+Post	8+3+.25G	96	96	94	80	99	93	93	0	0
Sethoxydim+AC222293+OC	Post	3+2+.25G	99	99	98	0	50	0	0	0	0
Sethoxydim+AC222293	Post	3+4+.25G	98	99	99	43	50	25	0	0	0
Seth+AC222293+Benaz+Po	Post	3+4+6+.25G	95	96	91	88	99	85	85	0	75
High mean			99	99	99	91	99	98	99	5	75
Low mean			0	0	0	0	0	0	0	0	0
Exp man			95	82	64	63	68	77	73	0	7
C.V. %			3	5	20	21	36	19	10	619	98
LSD 5%			4	6	18	19	34	21	10	NS	9
LSD 1%			5	7	24	26	46	27	13	NS	12
# of Reps			4	4	4	4	4	4	4	4	4

Summary

Benazolin in combination with sethoxydim and AC-222293 caused severe injury to sunflower. The low control of wild mustard and Russian thistle with prometryn applied with trifluralin indicates possible antagonism as at several other locations. AC-222293 controlled wild mustard except when applied with sethoxydim. Fluorochloridone tended to give greater weed control when surface applied than when incorporated.

Weed control in sunflower, Minot 1984. PPI treatments were applied and roto tiller incorporated, Jacques 503 sunflower seeded and PE treatments applied on May 30. Post treatments were to 6 leaf sunflower on July 2. Evaluation was on July 12.

Treatment	Rate oz/A	Snfl %ir	--Percent Kocz	control-- Wimu	Ruth
EPTC+Clam PPI	40+29	3	82	75	63
Trifluralin+Clam PPI	12+29	3	78	45	74
Pendimethalin+Clam PPI	16+29	0	69	63	61
Ethafluralin+Clam PPI	12+29	0	89	48	85
Trifluralin+R40244 PPI	12+8	0	88	86	61
Trifluralin/R40244 PPI/PE	12+8	0	99	95	89
Trifluralin+Prometryn PPI	12+32	3	77	55	69
Prometryn PE	48	1	90	92	85
Trifluralin/Desmedipham PPI/POST	12+6	9	86	82	80
Trifluralin/Acifluorfen PPI/POST	12+2	4	84	86	72
Trifluralin+Benazol+PO PPI	12+6+.25G	0	73	45	62
Trifluralin/AC222293 PPI/POST	12+4.8	1	91	95	86
R40244/Sethoxydim+PO PE/POST	8+3+.25G	0	97	99	93
Sethoxydim+AC222293+OC POST	3+2.4+.25G	0	28	96	31
Sethoxydim+AC222293+OC POST	3+4.8+.25G	6	46	94	29
Sethoxy+AC222293+Benaz+PO	3+4.8+6+.25G	11	67	95	50
Untreated check	0	0	0	0	0
Mean		2	73	73	64
High mean		11	99	99	93
Low mean		0	0	0	0
Coeff. of variation		193	17	14	29
LSD(1 Percent)		8	23	19	34
LSD(5 Percent)		6	18	15	26
No. of reps		4	4	4	4

Summary

None of the treatments caused any stand reduction or important injury to sunflower. Chloramben incorporated along with EPTC generally gave higher wild mustard control when with dinitroamiline herbicides. R-40244 surface applied gave higher wild mustard control than when soil incorporated. AC-222293 gave excellent postemergence control of wild mustard, but not kochia or Russian thistle. R-40244 surface applied gave excellent kochia and Russian thistle control.

Acifluorfen with insecticides in sunflower, Minot 1984. Jacques 503 sunflower was seeded on May 30. Treatments were applied to four leaf sunflower on July 2. Carb = carbofuran = Furidan and Fenv = fenvalerate = Pydrin.

Treatment	Rate	Sunflower injury July 13	Sunflower injury July 30	Sunflower injury Aug 13	Field penny cress control July 13	Field penny cress control July 30	Field penny cress control Aug 13
		(%)			(%)		
Acifluorfen	.375	44	44	50	78	92	87
Acifluorfen	.50	75	62	37	83	100	91
Acif+Carb	.375+1.0	53	56	44	86	87	84
Acif+Carb	0.5+1.0	67	50	50	89	96	94
Acif+Fenv	.375+.20	58	50	47	83	90	84
Acif+Fenv	.50+.20	67	56	34	86	97	92
Check		0	0	0	0	0	0
Acifluorfen	.08	11	19	6	36	60	52
Acifluorfen	.12	14	19	19	47	62	52
Acif+Carb	.08+.50	11	19	19	42	62	42
Acif+Carb	.12+.50	11	25	31	53	57	60
Acif+Fenv	.08+.04	11	19	6	53	57	54
Acif+Fenv	.12+.04	11	25	19	55	45	52
High Mean		75	62	50	89	100	94
Low Mean		0	0	0	0	0	0
Exp Mean		33	34	28	61	70	65
C.V. %		24	38	53	11	21	20
LSD 5%		11	19	21	10	21	19
LSD 1%		15	25	28	13	28	25
# of Reps		4	4	4	4	4	4

Treatment	Rate (lb/A)	Test Weight (lb/bu)	Yield 10% H20 (lb/A)	Height (in)	Population (plants/A)	Lodged (%)	Oil* (%)
Acifluorfen	0.37	26.1	1929	60	15899	6	42.9
Acifluorfen	0.5	25.6	1602	58	13286	3	43.0
Acif+Carb	0.37+1.0	26.7	1872	59	14375	1	48.1
Acif+Carb	0.5+1.0	26.6	1868	60	15028	7	40.7
Acif+Fenv	0.37+0.2	26.7	1614	59	12850	0	46.1
Acif+Fenv	0.5+0.2	26.8	1925	59	13504	2	40.7
Check		27.4	1833	61	15028	3	44.5
Acifluorfen	0.08	27.6	1744	61	13068	1	45.6
Acifluorfen	0.12	26.4	1593	58	13504	0	45.4
Acif+Carb	0.08+.5	26.7	1191	58	13286	1	43.9
Acif+Carb	0.12+.5	28.0	1750	58	13286	3	43.8
Acif+Fenv	0.08+.04	27.0	1666	59	12415	2	44.5
Acif+Fenv	0.08+.04	27.0	1470	60	13721	1	45.6
High Mean		28.0	1929	61	15899	6	48.1
Low Mean		25.6	1191	58	12414	0	40.7
Exp Mean		26.8	1696	59	13788	2	44.2
C.V. %		4.93	20.39	8.46	17.78	179	
LSD 5%		NS	NS	NS	NS	NS	
LSD 1%		NS	NS	NS	NS	NS	
# of Reps		4	4	4	4	4	

* On an oven dry basis

The addition of carbofuran or fenvalerate to acifluorfen did not influence injury to sunflower or control of field penny cress. Sunflower yield, seed test weight, population density, height, or lodging were not influenced by any of the treatments.

Weed control in sunflower, Langdon 1984. Preplant treatments were applied and roto tiller incorporated, sunflower seeded and preemergence treatments applied on June 4. Postemergence treatments were applied to 4 leaf sunflower and weed 2 to 6 inches tall on July 6. Weed control and crop response were evaluated on July 28. Volunteer flax and kochia densities were variable.

Treatment	Rate oz/A	-Sunflower- %sr	%ir	--Percent Grft	control-- Flax	Kocz
EPTC+Chloramben PPI	40+29	0	0	83	30	33
Trifluralin+Chloramben PPI	12+29	0	0	94	8	91
Pendimethalin+Chloramben PPI	16+29	0	0	96	23	55
Ethafluralin+Chloramben PPI	12+29	0	3	94	51	85
Trifluralin+R40244 PPI	12+8	0	0	93	26	58
Trifluralin/R40244 PPI/PE	12+8	0	0	95	50	86
Trifluralin+Prometryn PPI	12+32	0	0	97	78	80
Prometryn PE	48	0	0	83	46	63
Trifluralin/Desmedipham PPI/POST	12+6	0	0	97	61	90
Trifluralin/Acifluorfen PPI/POST	12+2	0	4	96	45	74
Trifluralin+Benazol+PO PPI	12+6+.25G	0	39	97	65	95
Trifluralin/AC222293 PPI/POST	12+4	0	5	74	74	59
R40244/Sethoxydim+PO PE/POST	8+3+.25G	0	0	97	9	84
Sethoxydim+AC222293+PO POST	3+2+.25G	0	3	97	70	36
Sethoxydim+AC222293+PO POST	3+4+.25G	3	0	96	86	33
Sethoxy+AC222293+Benaz+PO	3+4+6+.25G	10	53	98	71	79
Untreated check	0	0	3	0	0	10
Mean		1	6	87	47	65
High mean		10	53	98	86	95
Low mean		0	0	0	0	10
Coeff. of variation		683	68	11	46	25
LSD(1 Percent)		9	8	17	40	30
LSD(5 Percent)		7	6	13	30	23
No. of reps		4	4	4	4	4

Summary

Benazolin was the only herbicide which caused important injury to sunflower. Volunteer flax was not controlled completely by any treatment. Green foxtail control with postemergence sethoxydim did not appear to be antagonized by AC-222293. Treatments with chloramben, R-40244 PE, desmedipham, or benazolin were most effective for kochia control.

Weed control in sunflower, Carrington 1984. Preplant treatments were applied and roto tiller incorporated on June 13 and NK-265 sunflower seeded, and preemergence treatments applied on June 14. Postemergence (P) treatments were applied to 4 leaf sunflower and 1 to 2 inch tall weeds on July 2. Evaluation was on July 24. Weed densities were: green foxtail 5 and redroot pigweed 3 plant per sq. ft. and common lambsquarter 1 to 15 plants per sq. meter.

Treatment	Rate oz/A	---Snfl-- %sr	%ir	----% control--- Grft	Rrpw	Colq
EPTC+Clam PPI	40+29	0	1	98	96	97
Trifluralin+Clam PPI	12+29	1	0	97	92	99
Pendimethalin+Clam PPI	16+29	4	5	98	94	98
Ethafluralin+Clam PPI	12+29	0	0	99	94	99
Trifluralin+R40244 PPI	12+8	0	0	93	96	99
Trifluralin/R40244 PPI/PE	12+8	4	0	96	98	99
Trifluralin+Prometryn PPI	12+32	3	0	85	91	96
Prometryn PE	48	1	1	83	98	98
Trifluralin/Desmedipham PPI/POST	12+6	1	4	91	91	98
Trifluralin/Acifluorfen PPI/POST	12+2	0	0	89	90	91
Trifluralin+Benazol+PO PPI	12+6+.25G	5	1	88	82	86
Trifluralin/AC222293 PPI/POST	12+4	0	1	89	91	99
R40244/Sethoxydim+PO PE/POST	8+3+.25G	3	3	98	96	90
Sethoxydim+AC222293+OC POST	3+2+.25G	0	1	99	0	13
Sethoxydim+AC222293+OC POST	3+4+.25G	0	0	99	0	33
Sethoxy+AC222293+Benaz+PO	3+4+6+.25G	0	80	99	95	93
Untreated check		0	0	0	0	0
Mean		1	6	88	77	82
High mean		5	80	99	98	99
Low mean		0	0	0	0	0
Coeff. of variation		262	44	5	11	16
LSD(1 Percent)		6	5	9	15	24
LSD(5 Percent)		5	4	7	11	18
No. of reps		4	4	4	4	4

Summary

All treatments gave more than 80% green foxtail, redroot pigweed and common lambsquarter control, except for sethoxydim with AC-222293 which did not adequately control redroot pigweed or common lambsquarter. Benozolin postemergence was the only herbicide treatment to cause important injury to sunflower.

Preemergence weed control in soybean and drybean, Casselton 1984. Treatments were applied and McCall soybean and Fleetwood navybean were seeded on May 17. Evaluation was on June 29.

Treatment		Rate oz/A	Soya %ir	Navy %ir	-% control- Wimu	Yeft
EPTC	PPI	32	0	0	11	80
EPTC	PPI	48	0	0	13	93
EPTC	PPI	64	8	1	16	91
EPTC&R-33865	PPI	32	0	0	9	93
EPTC&R-33865	PPI	48	1	0	14	95
EPTC&R-33865	PPI	64	0	0	9	95
EPTC+Trif+Clam-W	PPI	32+8+22	0	0	39	94
EPTC&R-33865+Trif+Clam-W	PPI	32+8+22	0	0	31	98
Ethalfluralin	PPI	15	1	0	36	97
Ethalfluralin	PPI	27	0	0	48	96
Etha+Clam-W	PPI	15+22	1	0	52	96
Etha+Clam-W	PPI	15+29	0	0	58	97
Trif+Clam-W	PPI	16+29	0	0	51	97
Trif+Cyan-L	PPI	16+16	0	0	69	93
Pend+Clam-W	PPI	20+29	3	3	55	95
Alac+Clam-W	PPI	40+29	0	0	75	98
Meto+Clam-W	PPI	40+29	0	0	60	97
Pend+Metr-F	PPI	20+3	0	5	87	96
Trif+Metr-F	PPI	16+3	1	5	73	97
Pendimethalin	PPI	20	0	0	18	93
Trifluralin	PPI	16	1	0	5	95
Imazaquin	PE	4	16	6	99	97
Alachlor	PE	40	0	0	39	91
Metolachlor	PE	40	5	1	43	92
Imazaquin	PE	4	0	0	99	96
Meto+Metr-F	PE	40+3	0	0	94	95
Meto+Cyan-L	PE	40+16	9	8	80	92
Meto+Cyan-L	PE	40+32	1	3	94	96
Cynmethylin	PE	16	0	0	12	84
Cynmethylin	PE	19	0	0	16	86
Cynmethylin	PE	22	0	1	19	92
Cynmethylin+Metr-F	PE	19+3	0	0	74	92
Cynmethylin+Fluor	PE	19+4	3	1	90	95
Mean			2	1	48	94
High mean			16	8	99	98
Low mean			0	0	5	80
Coeff. of variation			280	298	32	5
LSD(1 Percent)			8	6	29	9
LSD(5 Percent)			6	4	22	7
No. of reps			4	4	4	4

Summary

AC-252214, cyanozine, fluorochloridone and metribuzin preemergence all gave 90% or more wild mustard control. All treatments gave 80% or more yellow foxtail control.

Postemergence broadleaf weed control in beans, Casselton 1984. McCall soybean and Fleetwood navybean were seeded on May 17. Treatments were applied to 2nd trifoliolate soybean and navybean, 2-6 inch wild mustard and 2-4 inch common lambsquarter and redroot pigweed on June 25 with 80F, 60% RH, sunny sky and 12-20mph wind. Sethoxydim at 3 oz/a + Poss was applied on June 27 and the 10 day treatment was applied on July 10. Evaluation was on July 18 with weed densities for redroot pigweed 1/sq. meter, wild mustard 2/sq.ft. and common lambsquarter 3/sq.ft.

Treatment	Rate oz/A	Soya %ir	Navy %ir	Percent control Wimu	Colq	Rrpw
Bentazon+POSS	8+.25G	3	0	98	80	63
Ben+PO/Ben+PoP+10d8+.12G/8+.12G		5	0	99	90	87
Bentazon+POSS P	16+.25G	1	0	99	93	76
PPG-844+POSS P	3.2+.12G	15	17	96	14	94
PPG-1013 P	.3	16	8	98	79	74
DPX-F6025 P	.06	0	1	63	5	15
DPX-F6025+POSS P	.06+.12G	3	1	91	11	31
DPX-F6025+SOSA P	.06+.12G	3	5	87	16	43
DPX-F6025+X-77 P	.06+.25%	1	3	90	10	23
DPX-F6025+POSS P	.12+.12G	1	1	98	20	41
Benazolin+POSS P	4+.25G	6	3	60	75	70
Benazolin+Acif+POSS P	4+1+.25G	5	4	98	88	93
PP-021+POSS P	2+1%	1	0	99	43	91
PP-021+POSS P	4+1%	3	0	99	48	76
PP-021+POSS P	8+1%	5	3	99	44	82
PP-021+Bent+POSS	1+8+1%	0	0	99	76	56
Acif-RH	2	1	4	94	13	63
Acif-RH	4	3	3	99	18	75
Acif-RP	4	1	8	99	18	73
Acif-RH+POSS	4+.25G	10	13	98	79	96
Acif-RH+Bent	4+8	4	1	98	81	87
Napt&Dino	24	13	13	92	30	55
Napt&2=4-DB	20	21	35	66	34	58
AC-252214+X-77	4+.25%	11	16	98	82	97
Untreated weed free	0	0	0	99	99	99
Mean		5	5	93	50	69
High mean		21	35	99	99	99
Low mean		0	0	60	5	15
Coeff. of variation		81	87	4	26	17
LSD(1 Percent)		8	9	7	24	22
LSD(5 Percent)		6	7	5	18	17
No. of reps		4	4	4	4	4

Summary

None of the treatments caused any observable crop stand reduction. Wild mustard control exceeded 95% with bentazon,PPG-844, PPG-1013,DPX-F6025 at 0.12 oz/A, acifluorfen, PP-021, and AC-252214. Bentazon as a split application, benazolin with acifluorfen, and AC-252214 were the only treatments to give 87% or more control of the broadleaf weeds. PPG-844, acifluorfen,and PP-021 were more effective on redroot pigweed than common lambsquarter.

Postemergence grass and broadleaf weed control in beans, Casselton 1984. McCall soybean and Fleetwood navybean were seeded on May 17 and 1st post treatments were applied to second trifoliolate beans, 2-6 inch weeds on June 25 with 80F, 60% RH and sunny sky. 2nd day treatments were applied June 27 and 10 day treatments were applied to the bean bud stage July 5 with 70F, 50% RH sunny and north wind at 10mph. Evaluation was on July 18.

Treatment	Rate oz/A	Soya %ir	Navy %ir	--Percent Yeft	control-- Wimu	Colq	Rrpw
HOE33171+PO	2.4+.25G	0	0	92	0	0	0
HOE33171+Bent+Acif+PO P	2.4+8+4+.25G	5	8	65	99	66	92
HOE33+PO/Bent+Acif P+2days	2.4+.25G+8+4	3	3	99	99	76	90
Ben+Aci/Seth+Ben+PO P+10d	12+4+3+8+.12G	1	6	64	99	86	96
Ben+Aci/Seth+Ben+PO P10	12+4+3.7+8+.12G	1	3	75	99	84	88
Ben+Aci/Seth+Ben PO P10	12+4+4.5+8+.12G	3	6	66	99	83	94
Ben+PO/Seth+Ben+PO P10	12+.12G+3+8+.12G	0	3	55	99	85	94
Ben+Aci+PO/Seth+PO P10d	8+2+.12G+3+.12G	3	6	68	99	70	95
PPG-844+Seth+PO P	2.5+3+.12G	5	13	94	86	20	83
PPG-1013+Seth+PO P	.3+3+.12G	3	11	99	97	49	50
Bent+Flua+PO	12+2+1%	0	0	56	98	75	78
Acif+Flua+PO	8+2+1%	9	14	68	99	61	94
Bent+Haloxy+POSS	12+.5+.12G	0	0	47	96	80	81
Bent+Haloxy+POSS	12+1+.12G	3	3	53	97	77	82
Bent+Haloxy+POSS	12+2+.12G	0	0	86	99	74	81
Acif+Haloxy+POSS	8+.5+.12G	5	10	50	99	65	92
Acif+Haloxy+POSS	8+1+.12G	8	15	57	99	58	96
Acif+Haloxy+POSS	8+2+.12G	8	13	80	98	39	92
DPX-F6025+DPX-Y6202+PO	.12+.5+.12G	0	69	43	99	24	83
Bent+DPX-Y6202+PO	12+.5+.12G	0	0	33	98	84	77
Acif+DPX-Y6202+PO	8+.5+.12G	5	6	36	99	71	93
Bent+Cloproxydim+PO	12+1+.25G	0	1	63	96	90	84
Acif+Cloproxydim+PO	8+1+.25G	5	9	75	99	63	95
Cloproxydim+PO	1+.25G	0	0	98	0	0	0
Sethoxydim+PO	3+.25G	0	0	99	0	0	0
Fluazifop+PO (PP005)	2+1%	0	0	90	0	0	0
Fluazifop-4+PO (PP009)	4+1%	0	0	94	0	0	0
Haloxyfop+PO	.5+.12G	0	0	86	0	0	0
Haloxyfop+PO	1+.12G	0	0	97	0	0	0
DPX-Y6202+PO	.5+.12G	0	0	84	0	0	0
Untreated weed free	0	0	0	99	99	99	99
Mean		2	6	73	73	51	65
High mean		9	69	99	99	99	99
Low mean		0	0	33	0	0	0
Coeff. of variation		165	79	15	2	24	12
LSD(1 Percent)		6	9	20	3	23	15
LSD(5 Percent)		5	7	15	2	17	11
No. of reps		4	4	4	4	4	4

Summary

None of the treatments caused any observable crop stand reduction. Navy beans were generally injured more than soybeans by acifluorfen, PPG-844, PPG-1013, and DPX-F6025. Only DPX-F6025 caused important injury to soybeans. Yellow foxtail control with all grass control herbicides was reduced by all of the broadleaf herbicides except for sethoxydim plus PPG-844 or PPG-1013. Wild mustard control was more than 90% with all broadleaf control herbicides, except PPG-844 with 80% control. The highest control of both common lambsquarters and redroot pigweed was obtained with bentazon+acifluorfen. Haloxyfop at 2 oz/A was required when applied with bentazon or acifluorfen for

Weed control in soybeans, Carrington 1983. PPI treatments were applied and roto-tiller incorporated on June 8. McCall soybean seeded on June 9 and PE treatment applied on June 10. A 0.71 inch rain occurred on June 13. The post-emergence treatment of BAS-9052 was on July 6 and the other Postemergence treatmemts on July 12 when the soybeans were 6 to 8 inches tall and in the V3 stage.

Treatment	Rate oz/A	--Beans-- %ir	%std	------Percent FXtl	Wibu	control------ Colq	Wimu	Rrpw
Trifluralin PPI	12	1	100	81	66	74	8	86
Trifluralin+Metribrzin PPI	12+2.5	1	100	89	93	91	98	98
Trifluralin+Metribrzin PPI	12+4	1	100	91	68	95	99	98
Pendimethalin PPI	20	4	96	93	76	60	18	64
Pendimethalin+Metribryin PPI	20+4	3	100	88	80	93	98	94
Alachlor+Metribryin PE	32+4	1	100	99	65	100	100	100
Diclofop+Bentazon P	16+16	13	100	61	93	100	100	89
BAS-9052+Bentazon P	5+16	8	100	97	86	68	91	71
BAS-9052+Acifluorfen P	5+6	8	100	100	30	43	59	79
Ethalfluralin PPI	11	3	95	95	64	68	43	86
Control	0	0	0	0	0	0	0	0
Mean		4	90	81	65	72	65	79
High mean		13	100	100	93	100	100	100
Low mean		0	0	0	0	0	0	0
Coeff. of variation		68	4	11	26	26	21	21
LSD(1 Percent)		5	6	17	33	36	26	33
LSD(5 Percent)		4	5	13	25	27	19	24
No. of reps		4	4	4	4	4	4	4

Summary

Treatments with metribryin or bentazon gave 90% or more wild mustard control. All treatments except diclofop gave 80% or more foxtail control.

Bentazon interaction with malathion in soybeans, Fargo 1984. Treatments were applied to Evans soybeans 12 inches tall on July 30, 31, and August 1. Soybean response was evaluated on August 6.

Treatment	oz/A	Soya %ir
Carboxyl	20	0
Untreated	0	0
Malathion	20	0
Malathion after bentazon	20+16	23
Malathion before bentazon	20+16	26
Malathion and bentazon	20+16	38
Bentazon and carboxyl	16+20	0
Bentazon	16	0
Mean		11
High mean		38
Low mean		0
Coeff. of variation		26
LSD(1 Percent)		7
LSD(5 Percent)		5
No. of reps		3

Summary

Soybeans were injured when bentazon was applied with malathion and injury was reduced when treatments were separated by 1 day.Carbaryl applied with bentazon did not cause injury to soybeans.

Weed control in corn, Carrington 1984. Preplant treatment applied and roto tiller incorporated on June 13 and Funkes 0010X corn seeded, and preemergence treatments applied, June 14. Postemergence cyanazine + oil applied to 2.5 leaf corn on June 26 and the other postemergence treatments were applied to 3 leaf corn and 2 to 3 inch weeds on July 3. Evaluation was on July 24.

		Rate	---Corn--				
		lb/A	%ir	%sr	Grft	Rrpw	Colq
Butylate + Atra	PPI	3.1+0.8	0	0	95	98	98
Alac + Cyanazine	PPI	2+1.5	0	0	92	93	97
Alac + Atra	PPI	2+1.0	0	0	88	98	99
Alac + Fluo	PE	2+.5	13	0	92	99	98
Pend + Brox-ME4	PE+P	2+.25	0	0	82	95	99
Cyanazine + Oil	P	1.5	1	0	71	90	99
Atra + Oil	P	1	1	0	33	99	99
Atra + Clpy + Oil	P	.5+.5	3	0	48	98	99
Control			0	0	0	0	0
Mean			2	0	67	85	88
High mean			13	0	95	99	99
Low mean			0	0	0	0	0
Coeff. of variation			149	0	13	4	1
LSD(1 Percent)			6	0	18	6	2
LSD(5 Percent)			4	0	13	5	2
No. of reps			4	4	4	4	4

Summary

None of the treatments caused serious corn stand reduction or injury. Green foxtail control was over 80% with all treatments except cyanazine or atrazine plus oil. All of the herbicides gave excellent redroot pigweed and common lambsquarter control.

Weed control in safflower, Williston 1984. Preplant herbicides applied and incorporated first with a Triple K and second with a Glenco, Hartman safflower seed at 25 lb/A, 1.5 inch deep in 6 inch spaced rows, and preemergence herbicides applied on May 3 with 47 to 54 F and 80% R.H. Postemergence treatments were to 2 to 4-leaf safflower, 1-leaf green foxtail, 3.5-leaf wild oats and volunteer wheat and other weeds 1 to 2 inch tall on May 29 with 80 F and 15% R.H. The experiment was on soil which was fallow in 1983, with 6.8 pH and 2.1% organic matter, and fertilized with 50 lb/A nitrogen. Weed infestation at evaluation in July were dense Russian thistle, moderate wild oats and volunteer wheat, and light for the other species. Most broadleaf weeds probably emerged after postemergence treatment. Harvest was on August 30.

Treatment		Rate oz/A	--Safflower---- Ht cm	% sr	% ir	Yld lb/A	----Percent control- Gr ft	Wi oa	Vo gr	Ru th	Co lq	Wi mu
Pendimethalin	PPI (1 incorp)	16	48	0	0	379	83	66	20	43	95	0
Ethalfuralin	PPI (1 incorp)	16	49	0	0	512	96	88	63	83	95	30
Trifluralin	PPI	12	46	0	0	283	96	88	65	70	99	3
Trifluralin	PPI	16	47	0	0	475	98	90	60	89	99	5
Pendimethalin	PPI	16	45	0	0	264	97	80	34	55	90	5
Trif+Triallate	PPI	12+16	37	0	0	174	97	96	75	76	99	0
Ethalfuralin	PPI	12	40	0	0	432	98	96	85	81	99	30
Ethalfuralin	PPI	16	42	0	0	484	99	93	91	88	99	40
Ethalfuralin	PPI	24	48	0	0	665	99	98	89	97	99	75
Trif+Fluorochloridone	PPI	12+8	43	0	0	521	97	90	68	71	95	88
EPTC+Fluorochloridone	PPI	32+8	45	1	0	320	98	93	93	10	95	90
Trif/Seth+PO	PPI/Post	12+3+1	44	0	0	351	98	97	98	69	99	3
Trif/Fluo	PPI/PE	12+8	45	1	0	406	98	95	79	70	95	44
EPTC/Fluo	PPI/Post	32+8	44	0	0	306	98	93	97	20	99	85
Fluo+Pend	PE	8+20	42	0	0	148	46	8	0	20	50	73
Fluo/Seth+PO	PE/Post	6+4+1	43	0	3	265	51	79	86	8	0	33
Fluo/Seth+PO	PE/Post	8+4+1	43	0	1	272	59	80	93	18	0	41
Fluo/Seth+PO	PE/Post	12+4+1	47	0	0	498	84	95	93	15	75	66
Fluorochloridone	PE	16	47	0	0	196	6	0	0	14	50	83
Chlorsulfuron+Seth+PO	PE	.125+3+1	44	0	3	541	74	84	88	76	99	96
Chlorsulfuron+Seth+PO	Post	.0625+3+1	44	0	1	543	43	83	91	75	99	91
Weedy check			45	0	0	142	0	0	0	0	0	0
Trif/Chlor+Seth+PO	PPI/Post	12+.125+3+1	46	0	0	668	99	99	99	94	99	99
Untreated check			41	0	0	106	0	0	0	0	0	0
High mean			49	1	3	668	99	99	98	97	99	99
Low mean			37	0	0	106	0	0	0	0	0	0
Exp mean			44	0	0	369	75	74	65	52	77	45
C.V. %			9	698	436	30	14	11	18	27		43
LSD (5 percent)			6	NS	NS	155	15	11	17	20		27
LSD (1 percent)			NS	NS	NS	206	20	15	22	26		36
# of reps			4	4	4	4	4	4	4	4	4	4

Summary

Fluorochloridone preplant incorporated gave higher wild mustard control than when suface applied. The wild mustard whcih germinated during the early seeding dry period probably were not controlled by the fluorochloridone on the dry soil surface. Trifluralin fallowed with postemergence chlorsulfuron and sethoxydim gave excellent broadspectrum weed control and safflower yield more than 6 times higher than the control. Sethoxydim gave less green foxtail than wild oats on volunteer wheat control probably because the foxtail had not all emerged at treatment.

Postemergence weed control in safflower, Williston 1984. Hartman safflower was seeded 1.5 inch deep at 25 lb/A in 6 in spaced rows on May 3. The soil was fallow in 1983, had 2.1% organic matter, a 6.8 pH, and was fertilized with 50 lb/A nitrogen. Treatments were applied to 2 to 4-leaf safflower and emerging to 3 inch weeds except wild oats and volunteer grain was in the 4 to 5-leaf stage, on June 7 with 67 F and 61% R.H.. The 4 to 8-leaf safflower stage treatments were to 2 to 4-leaf green foxtail. Tillering wild oats and grains, 2 to 8-leaf wild mustard, and other broadleaf weeds 1 to 4 inches, on June 15 with 89 F and 63% R.H.. Weed infestations were light, except for moderate infestations of wild oats, volunteer grain, and Russian thistle. SA = emulsifiable safflower oil. Harvest was on August 30.

			-Percent control					--	---Safflower--			
			Gr	Wi	Vo	Ru	Wi	Co	Ht	%	%	Yld
Treatment	Stage	Rate	ft	oa	gr	th	mu	lq	cm	sr	ir	lb/A
Chlorsulfuron+Seth+PO	2-4lf	.125+3+1qt	96	95	96	68	99	99	40	0	0	553
Chlorsulfuron+Seth+SA	2-4lf	.125+3+1qt	88	91	91	68	99	99	37	0	0	442
Chlorsulfuron+Seth+PO	2-4lf	.0625+1qt	95	98	98	58	99	99	39	0	0	449
Chlorsulfuron+PO	2-4lf	.125+1qt	61	0	0	79	99	99	42	0	0	195
Chlorsulfuron+PO	2-4lf	.0625+1qt	48	0	0	76	99	99	38	0	0	446
Chlorsulfuron+SA	2-4lf	.125+1qt	75	0	0	73	75	75	42	0	0	136
Chlorsulfuron+SA	2-4lf	.0625+1qt	60	0	0	59	99	93	44	0	0	188
Chlorsulfuron	2-4lf	.0625	40	0	0	39	99	88	40	0	0	99
Chlorsulfuron	2-4lf	.125	68	0	0	49	75	90	42	0	0	86
Chlorsulfuron	2-4lf	.25	83	0	0	70	99	99	41	0	0	184
Sethoxydim+PO	2-4lf	3+1qt	95	85	95	0	0	0	36	0	0	219
Sethoxydim+PO	2-4lf	8+1qt	99	99	99	0	0	0	39	0	0	230
PP005+PO	2-4lf	.25+1qt	99	99	98	0	0	0	38	0	0	193
PP005+PO	2-4lf	.50+1qt	99	99	99	0	0	0	38	0	0	182
Chlorsulfuron+Seth+PO	4-8lf	.0625+4+1qt	97	96	96	95	99	99	37	0	0	516
Chlorsulfuron+Seth+PO	4-8lf	.125+4+1qt	96	95	95	93	99	99	39	0	9	569
Chlorsulfuron+Seth+SA	4-8lf	.125+4+1qt	97	96	96	98	99	99	41	0	4	590
Chlorsulfuron+PO	4-8lf	.0625+1qt	10	0	0	70	75	73	38	0	0	129
Chlorsulfuron+PO	4-8lf	.125+1qt	40	0	0	84	99	99	29	0	0	62
Chlorsulfuron+SA	4-8lf	.0625+1qt	31	0	0	92	99	99	38	0	0	203
Chlorsulfuron+SA	4-8lf	.125+1qt	38	0	0	93	99	99	36	0	1	77
Chlorsulfuron	4-8lf	.125	50	0	0	93	99	98	39	0	3	138
Chlorsulfuron	4-8lf	.25	49	0	0	96	99	99	39	0	0	94
Sethoxydim+PO	4-8lf	4+1qt	97	97	97	0	0	0	38	0	3	217
PP005+PO	4-8lf	.25+1qt	99	99	99	0	0	0	37	0	0	167
Untreated check			0	0	0	0	0	0	39	0	0	84
High mean			99	99	99	98	99	99	44	0	9	590
Low mean			0	0	0	0	0	0	29	0	0	61
Exp mean			70	44	45	56	70	70	38	0	1	235
C.V. %			22	11	5	24	25	22	15	0	251	39
LSD (5 percent)			22	7	3	19	24	22	NS	NS	3	130
LSD (1 percent)			29	9	4	25	32	29	NS	NS	4	172
# of reps			4	4	4	4	4	4	4	4	4	4

Summary

Safflower oil appeared similiar to petroleum oil as an additive, but the datawere variable. Chlorsulfuron gave higher Russian thistle control with the late than the early treatment, but lower green foxtail control. Sethoxydim and PP-005 controlled grass species at both stages of treatment. None of the treatments caused important injury to safflower. Safflower yield generally reflected weed control.

Weed control with chlorsulfuron, Williston 1984. Hartman safflower was seeded at 25 lb/A in 6 inch row spacings on May 8 in soil which was fallowed in 1983, had 2.1% organic matter, 6.8 pH, and was fertilized with 50 lb/A nitrogen. Treatments were applied to 2-4 leaf safflower and 2-5 leaf or 1 to 4 inch weeds on June 7 with 69F and 56% relative humidity. Weed control evaluation was on July 19. Harvest was on August 30.

Treatment	Rate	---- Percent Control----						%oil	-Safflower-		
	oz/A	Grft	Wioa	Vogr	Ruth	Wimu	Colq		Ht cm	%ir	Yield lb/A
Chlorsulfuron	.25	56	0	0	86	100	99	38.1	42	0	101
Chlorsulfuron	.167	36	0	0	75	100	95	39.0	42	1	194
Chlorsulfuron	.125	41	0	0	55	100	82	39.3	43	0	167
Chlorsulfuron	.083	35	0	0	56	100	85	38.7	43	0	155
Chlorsulfuron	.0625	0	0	0	36	100	53	38.6	41	0	114
Control		0	0	0	0	0	0	37.9	40	0	108
Chlorsulfuron+X-77	.25+.25%	79	0	0	92	100	100	39.9	42	6	116
Chlorsulfuron+X-77	.167+.25%	72	0	0	91	100	100	39.6	40	0	92
Chlorsulfuron+X-77	.125+.25%	68	0	0	90	100	100	40.3	43	0	173
Chlorsulfuron+X-77	.083+.25%	44	0	0	85	100	100	40.4	46	0	145
Chlorsulfuron+X-77	.0625+.25%	38	0	0	80	100	99	40.0	40	0	119
Control		0	0	0	0	0	0	38.8	42	0	80
Chlorsulfuron+PO	.25+1qt	78	0	0	90	100	100	38.7	41	8	88
Chlorsulfuron+PO	.167+1qt	71	0	0	89	100	100	39.3	37	2	49
Chlorsulfuron+PO	.125+1qt	68	0	0	92	100	100	38.2	42	1	87
Chlorsulfuron+PO	.083+1qt	50	0	0	84	100	100	39.3	38	0	98
Chlorsulfuron+PO	.0625+1qt	40	0	0	78	100	100	39.3	40	1	134
Control		0	0	0	0	0	0	39.1	42	0	135
Chlorsulf+Seth+PO	.25+3+1qt	86	97	98	90	100	100	38.3	39	5	582
Chlor+Seth+PO	.167+3+1qt	80	95	98	83	100	100	38.7	42	1	572
Chlor+Seth+PO	.125+3+1qt	86	97	97	83	100	100	37.9	43	0	563
Chlor+Seth+PO	.083+3+1qt	81	97	89	77	100	100	37.8	38	0	581
Chlor+Seth+PO	.0625+3+1qt	88	98	99	68	100	100	37.3	39	0	541
Control		0	0	0	0	0	0	38.5	40	0	156
High Mean		88	98	99	92	100	100		46	7	582
Low Mean		0	0	0	0	0	0		37	0	49
Exp Mean		50	20	20	66	83	80		41	2	214
C.V. %		27	5	4	14	0	11		11	200	30
LSD 5%		19	1	1	13	0	18		NS	3	90
LSD 1%		25	2	2	18	NS	25		NS	4	119
# of reps		4	4	4	4	4	4		4	4	4

Summary

Chlorsulfuron at 0.125 oz/A in combination with sethoxydim and petroleum oil additive gave 82% or higher control of all weeds present without injury to safflower. The X-77 and petroleum oil additive enhanced weed control with chlorsulfuron, except for wild mustard control which was complete at the lowest rate, 0.62 oz/A, with or without additives. Weed infestations were light except for a moderate infestation of wild oats, wild mustard, volunteer grains and Russian thistle.

Safflower response to postemergence chlorsulfuron, Williston 1984. Hartman safflower was seeded at 25lb/A 1.5 inches deep in 6 in rows on May 8. The soil was fallowed in 1983 had a pH of 6.8 and organic matter of 1.9% and was fertilized with 50 lb/A nitrogen. The experimental area wastreated with trifluralin at 0.75 lb/A and incorporated twice with a Multiweeder. Treatments were applied to 4 to 8 leaf safflower on June 18. Russian thistle at a low density was the only weed present. Harvest was on October 4.

Treatment	Rate oz/A	Ruth	Saff injury 3wks	Saff injury Harv	%oil	t.wt.	Yield lb/A
Chlorsulfuron	.25	98	4	4	37.5	38.9	683
Chlorsulfuron	.167	94	4	4	37.1	39.4	509
Chlorsulfuron	.125	93	3	1	37.3	38.9	582
Chlorsulfuron	.083	81	5	1	37.4	39.2	602
Chlorsulfuron	.0625	33	3	0	38.0	38.9	608
Control		0	0	0	38.0	38.8	633
Chlorsulfuron+X-77	.25+.25%	100	14	6	37.0	38.8	614
Chlorsulfuron+X-77	.167+.25%	100	14	9	36.3	39.0	554
Chlorsulfuron+X-77	.125+.25%	100	4	3	37.6	39.6	621
Chlorsulfuron+X-77	.083+.25%	98	3	4	35.9	38.8	574
Chlorsulfuron+X-77	.0625+.25%	98	3	3	37.2	39.3	550
Control		0	3	0	36.5	38.5	520
Chlorsulfuron+PO	.25+1qt	100	16	24	27.0	38.4	490
Chlorsulfuron+PO	.167+1qt	99	16	14	37.1	38.7	513
Chlorsulfuron+PO	.125+1qt	96	9	4	37.1	39.0	647
Chlorsulfuron+PO	.083+1qt	99	8	3	36.3	39.2	533
Chlorsulfuron+PO	.0625+1qt	99	5	6	36.9	39.0	629
Control		0	0	0	37.1	39.2	645
Chlorsulf+Seth+PO	.25+3+1qt	100	15	16	37.5	38.6	513
Chlor+Seth+PO	.167+3+1qt	100	19	13	36.3	38.3	447
Chlor+Seth+PO	.125+3+1qt	99	16	18	37.0	38.8	475
Chlor+Seth+PO	.083+3+1qt	100	1	4	37.1	39.2	622
Chlor+Seth+PO	.0625+3+1qt	90	9	8	37.2	38.7	523
Control		0	0	0	37.7	38.8	555
High Mean		100	19	24		39.6	684
Low Mean		0	0	0		38.2	447
Exp Mean		78	7	6		38.9	569
C.V. %		7	73	87			26
LSD 5%		8	7	7			NS
LSD 1%		10	10	10			NS
# of reps		4	4	4		4	4

Summary

Chlorsulfuron applied postemergence at 0.25 oz/A did not cause important injury to safflower. Seed yield was not influenced by treatment as Russian thistle density was low. Russian thistle was controlled with chlorsulfuron at 0.0625 oz/A with X-77 or petroleum oil additive. Sethoxydim in mixture with chlorsulfuron at 0.0625 oz/A tended to reduce Russian thistle control. Chlorsulfuron at 0.25 oz/A without an additive was needed for similar Russian thistle control to 0.062 oz/A with an additive.

Weed control in grain sorghum, Carrington 1984. Preplant treatments were applied and roto tiller incorporated on June 13 and NK-X3174 sorghum seeded, and preemergnece treatment applied on June 15. Post-emergence atrazine, trifluralin (+ cultivation), and pendimethalin treatments applied to two leaf weeds and three leaf sorghum on June 28. The dicamba, 2,4-D, and bromoxynil treatments were applied on July 13. Evaluation was on July 24. Weed densities per sq. ft. were 5 green foxtail, 3 redroot pigweed, 1 to 5 common lambsquarter and less than 1 wild buckwheat. Flur=flurazole (Screen) and CGA=(Concept) used to treat the seed.

Treatment		Rate lb/A	Sorghum %sr	%ir	--Percent Grft	Control-- Rrpw	Colq	Wibu
Prcl + Atra	PPI	3+1	4	5	90	97	99	98
Prcl + Cyan	PPI	3+1.5	1	5	87	88	96	88
Prcl + Praz	PPI	3+1.5	11	1	93	99	99	99
Terb + Cyan	PPI	1.5+1	5	1	90	90	97	95
Alac + Atra (Flur)	PPI	2+1	5	1	96	99	95	94
Alac + Cyan (Flur)	PPI	2+1.5	8	4	95	95	89	92
Alac + Fluo (Flur)	PPI	2+.5	4	0	92	96	91	41
Alac + Atra (CGA)	PPI	2+1	9	5	97	98	98	98
Alac + Cyan (CGA)	PPI	2+1.5	13	3	86	87	91	79
Alac + Fluo (CGA)	PPI	2+.5	5	3	96	99	88	45
Alac/ME4 Brox	PPI/P	2+.25	5	5	97	99	93	74
Alac/Dicamba	PPI/P	2+.25	6	5	93	97	60	78
Alac/2,4-D	PPI/P	2+.4	1	1	93	95	88	48
Prcl + Atra	PE	3+1	1	4	83	94	89	87
Prcl + Cyan	PE	3+1.5	4	9	97	68	90	95
Prcl + Bife	PE	3+.75	1	8	91	89	90	63
Prcl + Praz	PE	3+1.5	4	0	93	96	99	91
Prcl + Fluo	PE	3+.5	3	0	95	98	97	76
Pend + Dica + Atra	P	1+.25	3	3	82	99	99	99
Trif + Cult	P	.75	0	0	69	49	63	33
Atra + Oil	P	1+.25G	0	0	51	98	99	91
Pend + Atra	P	1+.75	0	3	36	86	93	68
Atra + Tridiphane	P	.75+.5	1	3	55	96	95	70
Control			0	0	0	0	0	0
Mean			4	3	81	88	87	75
High mean			13	9	97	99	99	99
Low mean			0	0	0	0	0	0
Coeff. of variation			149	166	13	10	10	25
LSD(1 Percent)			11	8	19	16	16	35
LSD(5 Percent)			8	6	15	12	12	27
No. of reps			4	4	4	4	4	4

Summary

None of the treatments caused important injury to grain sorghum. All preemergence treatments gave more than 80% green foxtail control. Fluorochloridone, 2,4-D, or bifenox in combination with alachlor or propachlor preemergence gave less than 75% control of wild buckwheat.

Weed control in tame buckwheat, Langdon 1984. Preplant treatments applied and roto tiller incorporated, buckwheat seeded, and R-40244 applied on June 6. A rain prevented the preemergence application of alachlor until June 11. The entire experiment was treated with sethoxydim, and the postemergence treatments applied on July 6 when the buckwheat was 5 inches tall to early bud stage. Crop response and weed control evaluation were on July 28.

Treatment		Rate lb/A	----Buckwheat---- Yield bu/A	%sr	%ir	% control Kocz	Wimu
R-40244	PPI	0.25	3	0	9	68	68
R-40244	PPI	0.375	4	0	0	90	83
R-40244	PPI	0.5	6	0	3	90	86
R-40244	PE	0.25	4	0	0	78	68
R-40244	PE	0.5	5	3	8	81	63
R-40244	P	0.063	4	0	16	65	65
R-40244	P	0.125	4	0	31	84	81
Untreated check			3	0	0	0	0
2,4-D Amine	P	0.06	2	0	16	25	20
Alachlor	PE	3	4	0	0	79	53
2,4-D Amine	P	0.12	3	0	10	8	29
R-40244	P	0.25	4	0	31	91	85
Mean			4	0	10	63	58
High mean			6	3	31	91	86
Low mean			2	0	0	0	0
Coeff. of variation			30	693	69	27	22
LSD(1 Percent)			2	3	14	32	24
LSD(5 Percent)			2	2	10	24	18
No. of reps			4	4	4	4	4

Summary

None of the herbicides caused important tame buckwheat stand reductions. Postemergence treatments of R-40244 and 2,4-D caused moderate injury to the tame buckwheat. R-40244 preplant incorporated or preemergence appeared promising for kochia and wild mustard control in tame buckwheat.

<u>Antagonism of grass control herbicides by various broadleaf herbicides, Fargo 1984</u>. Era wheat, Moore oats, and Siberian millet were seeded in 6 ft. wide strips as bioassay grass species on May 10. Treatments were applied to jointing stage wheat and oats and five leaf millet on June 22. Soil moisture was excessive at treatment. The treatments were applied in an 8 ft. strip across the three species. Individual plots were 10 by 20 ft. replicated three times and treatments were applied in 8.5 gpa at 35 psi. Evaluations were on July 9 and 31.

The antagonism of grass control herbicide action was influenced by the broadleaf and grass control herbicides as well as the grass species involved, Table 1. Control of all species by clopropoxydim and sethoxydim was antagonized by benazolin and oats by lactofen and wheat by fomesafen. Fluazifop and haloxyfop were or tended to be antagonized by fomesafen for wheat; by bromoxynil and MCPA amine for millet; and oats control was not antagonized by any of the broadleaf herbicides. DPX-Y6202 control of oats and millet was antagonized by bromoxynil, MCPA amine and lactofen; of oats, also by MCPA ester; of millet also by benazolin and fomesafen; and wheat control was not antagonized by any of the broadleaf herbicides. Oats control by fenoxaprop was antagonized by all the broadleaf control herbicides except imazaquin, and millet control by all except imazaquin and benazolin. SC-1084 control of all species was or tended to be antagonized by benazolin, wheat by imazaquin, and millet by bromoxynil.

The average control of wheat and oats by all grass control herbicides was reduced 5% more by MCPA amine than by MCPA ester. Thus, formulation in part is involved in the antagonism of grass control by some of the herbicide mixtures.

Wheat and oats control with fenoxaprop was increased by imazaquin in combination with the grass control herbicide and wheat by lactofen. Control of all grass species was increased when lactofen was applied with SC-1084.

The data indicate that the antagonism of grass control with the various herbicide combinations is dependent upon individual herbicide, grass species, and herbicide formulations.

Table 1. Percent control of wheat, oats, and millet with various grass control herbicides as influenced by broadleaf control herbicides in the spray treatment.

Grass herbicide		Broadleaf herbicide and rate in oz/A[2]							
Herbicide	Rate	None	Imaza-quin	Bena-zolin	Brom-oxynil	MCPA DMA	MCPA BEE	Lact-ofen	Fome-safen
	(oz/A)	(Oats, % control)							
Clopropoxydim	0.75	89	75	66	91	92	95	77	75
SC-1084	2.0	90	82	75	88	86	92	74	84
Sethoxydim	1.5	86	85	83	58	43	52	58	82
Fluazifop	1.0	89	85	85	75	82	88	96	88
DPX-Y6202	0.5	99	95	97	95	94	93	92	94
Haloxyfop	0.5	58	84	48	21	12	20	33	38
Fenoxaprop	0.75	72	75	53	65	74	81	85	70
		(Wheat, % control)							
Clopropoxydim	0.75	59	64	41	66	60	69	65	50
SC-1084	2.0	75	70	52	76	71	70	78	54
Sethoxydim	1.5	88	85	87	87	85	90	85	91
Fluazifop	1.0	78	78	80	76	76	82	91	66
DPX-Y6202	0.5	89	88	83	80	81	81	89	69
Haloxyfop	0.5	3	56	11	2	1	10	23	15
Fenoxaprop	0.75	79	67	68	74	74	80	92	66
		(Millet, % control)							
Clopropoxydim	0.75	77	70	60	70	66	82	77	78
SC-1084	2.0	88	80	83	82	87	88	93	94
Sethoxydim	1.5	86	95	43	56	52	82	55	53
Fluazifop	1.0	37	89	28	22	23	49	57	58
DPX-Y6202	0.5	73	90	81	42	55	70	88	77
Haloxyfop	0.5	91	92	94	57	57	70	43	57
Fenoxaprop	0.75	37	83	25	23	37	42	57	57

LSD for wheat and oats = 10

LSD for millet = 22

[1] Fluazifop = PP - 005 formulation

[2] MCPA-DMA was dimethylamine and BEE = was beutoxyethanol ester. MCPA, bromoxynil, fomesafen, imazaquin, and lactofen at 4 oz/A and benazolin at 6 oz/A.

Overcoming grass herbicide antagonsim, Fargo 1984. Era wheat, Moore oats, and Siberian millet were seeded in 6 ft. wide strips as bioassay species, May 10, 1984. Treatments were applied to 5 to 6 leaf wheat and millet and jointing oats on June 20. Soil moisture was excessive at treatment. Plots were 10 ft. wide with 8 ft. treated across the three species. Treatments were replicated three times. All herbicide treatments were applied with emulsifiable petroleum oil at 1 qt/A in 8.5 gpa at 35 psi. Evaluations were on July 9 and 31 and millet was not included in the second evaluation.

Table 1. Percent grass species (average over wheat, oats, and Siberian millet) with various grass control herbicides as influenced by broadleaf control herbicides.

Grass herbicide	Rate	Broadleaf herbicide				
		Acif	Bent	Acif + Bent	Desm	None
	(oz/A)	(% control)				
Clopropoxydim	0.75	74	60	63	68	88
Clopropoxydim	1.5	88	75	76	80	96
Clopropoxydim	3.0	96	90	95	79	96
Sethoxydim	1.5	74	34	56	58	73
Sethoxydim	3.0	87	60	66	83	95
Sethoxydim	4.5	94	77	80	86	97
DPX-Y6202	0.75	93	96	88	78	96
DPX-Y6202	1.5	97	97	97	95	98
DPX-Y6202	3.0	99	99	98	98	99
Fluazifop[1]	0.75	50	71	85	57	82
Fluazifop	1.5	85	89	81	84	94
Fluazifop	3.0	96	93	88	94	98
Haloxyfop	0.75	88	95	88	87	97
Haloxyfop	1.5	98	98	98	98	98
Haloxyfop	3.0	99	98	98	98	99
Fenoxaprop	0.75	55	18	30	28	52
Fenoxaprop	1.5	60	59	50	50	65
Fenoxaprop	3.0	68	66	63	64	75
SC-1084	2	58	59	50	46	82
SC-1084	4	93	79	88	84	87
SC-1084	8	94	95	92	90	97
SC-1084		83	77	78	77	89

LSD = 7

[1] Fluazifop = PP-005 formulation

Table 2. Percent control of various grass species with several grass control herbicides, averaged over rating dates and broadleaf herbicides and rate of grass control herbicide.

Herbicide[1]	Low rate[2] (oz/A)	Millet	Oats	Wheat
		---(% control)---		
Clopropxydim	0.75	92	93	65
Sethoxydim	1.5	96	79	59
DPX-Y6202	0.75	93	95	97
Fluazifop	0.75	71	89	83
Haloxyfop	0.75	95	98	94
Fenoxyaprop	0.75	78	75	20
SD-1084	2	71	82	82
LSD				

[1] Fluazifop = PP-005 formulation

[2] Data are an average of three rates which were the listed rate and two times the low rate, except for sethoxydim when the other rates were two and three times the listed rate.

The antagonism by acifluorfen, bentazon, bentazon + acifluorfen, and desmedipham of phytotoxicity by the grass control herbicides was generally overcome by increasing the rate of grass control herbicide, Table 1. The grass species control was similar or higher when the grass control herbicides in the mixtures were at 3 to 4 times the rate alone, except for clopropoxydim with desmedipham. Grass control herbicides in mixtures at two times the alone rate overcame antagonism except for sethoxydim and clopropoxydim with bentazon, bentazon plus acifluorfen, or desmedipham. The rates of DPX-Y6202 and haloxyfop used in the experiment were too high for differential expression of antagonism to rates of grass herbicides. However, grass control was reduced when DPX-Y6202 at 0.75 oz/A was aplied with bentazon + acifluorfen and desmedipham; and when haloxyfop at 0.75 oz/A was applied with bentazon, bentazon plus acifluorfen, and desmedipham.

Clopropoxydim, sethoxydim, and fenoxoprop were most effective on millet followed by oats and then wheat, averaged over rates, broadleaf herbicides, and evaluation dates, Table 2. DPX-Y6202 tended to be most effective on wheat and least on millet, but control was high for all species. Fluazifop tended to be most effective on oats and least on foxtail; haloxyfop was most effective on oats and equally effective on wheat and millet; and SD-1084 was equally as effective on wheat and oat, but less effective on millet.

The data was averaged over the two evaluation dates as the influence of grass herbicide rates on antagonism by broadleaf herbicides was similar at both evaluations. However, the magnitude of differences was slightly larger with the second evaluation when plant recovery from treatment was evident. The overall average grass control was 83.2 for the first and and 76.4 for the second evaluation.

Various oil additives with grass control herbicides, Fargo 1984. Era wheat, Moore oats, and Siberian millet were seeded in 66 ft. wide adjacent strips as bioassay species, June 26. Treatments were applied when the species were in the 4 to 5-leaf stage on July 20. Plots were 10 ft. wide and treatment was on 8 ft. wide strips across the three species. Treatments were replicated four times. All crop origin oils were once refined and all, including petroleum oil 11N, contained 17% by volume emulsifier AT Plus 300F and applied at 1 qt/A. Evaluation was on July 27 and August 17. The August 17 rating was of only oats and millet as aphid damage occurred to wheat. Data presented in Table 1 are on average over ratings, replications, species, and rates of the grass control herbicides.

Grass control (averaged over species, ratings, and rates) by clopropoxydim and sethoxydim was enhanced similarily by the crop origin oils and petroleum oil, Table 1. Control of the grass species by haloxyfop was enhanced more by the petroleum oil than the crop origin oil additives. Diclofop and DPX-Y6202 control of the grasses was enhanced by the petroleum oil additive, but not by the crop origin oils. Grass control with fenoxaprop was not enhanced by petroleum oil, but was antagonized by crop origin oils.

The control of each species is presented in Table 2. The data for diclofop and fenoxaprop in Table 1 are low because wheat is not controlled by these herbicides. Thus, the magnitude of the influence from various oil additives was reduced, but did not affect the relative influence of the additives.

Table 1. Percent grass control with various herbicides as influenced by oil additives, data averaged over species, ratings, and rates of grass control herbicides.

Herbicide	Rate	Oil additive				
		None	Petroleum	Sunflower	Soybean	Linseed
	(oz/A)	(%)				
Clopropoxydim	0.5&1.5	40	74	77	77	71
Diclofop	6.0&12.0	30	37	28	33	21
DPX-Y6202	0.5&1.5	35	66	35	37	29
Haloxyprop	0.5&1.5	42	80	65	67	62
Fenoxaprop	0.5&1.5	47	51	36	41	44
Sethoxydim	1.0&3.0	48	80	76	77	80
LSD 5% = 5.9						

Table 2. Percent millet, oats, and wheat control with various grass control herbicides as influenced by oil additives, data over ratings of wheat, two of oats and millet and averaged over rates.

Herbicide	Rate	Oil additive				
		None	Petroleum	Sunflower	Soybean	Linseed
	(oz/A)	----------------------(%)----------------------				
				Millet		
Clopropoxydim	0.5&1.5	40	76	80	80	72
Diclofop	6.0&12.0	45	53	43	46	27
DPX-Y6202	0.5&1.5	47	73	47	48	30
Haloxyprop	0.5&1.5	36	79	65	70	65
Fenoxaprop	0.5&1.5	78	77	67	66	76
Sethoxydim	1.0&3.0	61	90	86	86	87
LSD 5% = 9.1						
				Oats		
Clopropoxydim	0.5&1.5	51	83	88	88	82
Diclofop	6.0&12.0	27	40	28	35	26
DPX-Y6202	0.5&1.5	23	58	30	28	29
Haloxyprop	0.5&1.5	55	88	72	74	67
Fenoxaprop	0.5&1.5	34	47	21	33	32
Sethoxydim	1.0&3.0	46	79	76	80	80
LSD 5% = 9.1						
				Wheat		
Clopropoxydim	0.5&1.5	17	55	51	48	46
Diclofop	6.0&12.0	4	0	0	3	0
DPX-Y6202	0.5&1.5	36	68	24	33	24
Haloxyprop	0.5&1.5	26	64	49	47	46
Fenoxaprop	0.5&1.5	10	9	5	5	4
Sethoxydim	1.0&3.0	23	64	53	53	64
LSD 5% = 12.8						

Lecithin as an additive to herbicides, Fargo 1984. Moore oats and Era wheat were seeded in six foot wide strips as bioassay crops. Treatments were applied to four leaf plants on September 7. Evaluation of phytotoxicity was on September 21 and September 27. Fluazifop was applied at 0.75 oz/A and sethoxydim at 1.5 oz/A and additives were at 1 qt/A. Treatments were replicated 3 times. All oils had 17% AT Plus 300F v/v emulsifier.

Herbicide	Additive[1]	Sept 21		Sept 27	
		Oats	Wheat	Oats	Wheat
		(% control)			
Fluazifop	none	43	42	63	75
Fluazifop	Pet.O. 11E	70	60	88	83
Fluazifop	Sun.F. 1R	48	52	65	68
Fluazifop	NAT 1312	57	62	73	80
Sethoxydim	none	37	22	48	35
Sethoxydim	Pet.O. 11E	73	62	87	78
Sethoxydim	Sun.F. 1R	63	52	81	77
Sethoxydim	NAT 1312	48	38	58	58
LSD (5%) = 10					

[1] Pet.O. = petroleum oil, Sun.F. 1R = once refined sunflower oil, and NAT 1312 = is a lecithin product.

Summary

NAT 1312 was stored at room temperature of 70 to 80 F for 3 months before usage and upon mixing with the herbicides, a scum was evident. NAT 1312 enhanced the phytotoxicity of fluazifop more than sethoxydim. Enhancement of fluazifop tended to be similar with NAT 1312 and petroleum oil. However, sethoxydim phytotoxicity was less with NAT 1312 than with petroleum or sunflower oil additives.

Grass herbicide combinations, Fargo 1984. Era wheat, Moore oats, and Siberian millet were seeded in 6 ft wide strips on May 10. Treatments were applied to jointing wheat and oats and five leaf millet on June 22. Evaluation was on July 6.

Treatment	Rate oz/A	Wheat %ir	Oat %ir	Millet %ir
Sethoxydim+POSS	1+.25G	67	65	94
Sethoxydim+POSS	2+.25G	83	94	97
Fluazifop+POSS	1+.25G	79	81	60
Fluazifop+POSS	2+.25G	88	94	84
Seth+Flua+POSS	.5+.5+.25G	77	77	88
Seth+Flua+POSS	1+1+.25G	87	95	98
Seth+Flua+POSS	1+.5+.25G	78	80	93
Seth+Flua+POSS	.5+1+.25G	82	87	92
Untreated check	0	0	0	0
Mean		71	75	78
High mean		88	95	98
Low mean		0	0	0
Coeff. of variation		7	7	11
LSD(1 Percent)		10	10	16
LSD(5 Percent)		8	8	12
No. of reps		4	4	4

Summary

Sethoxydim and fluazifop were additive in the control of the three species. Sethoxydim at loz/A was more effective than fluazifop at loz/A in controlling millet, but fluazifop was more effective than sethoxydim for wheat and oats. Sethoxydim in mixture with fluazifop each at one half the alone rate generally gave control which was intermediate to when alone. However, sethoxydim at 1 oz/A plus fluazifop at 1 oz/A gave higher millet control then fluazifop at 2 oz/A alone.

Mixing methods for DPX-Y6202, Fargo 1984. Era wheat, Moore oats, and Siberian foxtail millet were seeded in 6 foot wide strips on June 26. Treatments were applied on July 20 to the 5-leaf stage grass species. Evaluation was on August 7. The / lines indicate order of mixture and a double // indicates mixing two pre-emulsified materials.

Treatments	Rate oz/A	--Percent control-- Oat	Wheat	Millet
POSS+DPX-Y6202/water	.25G+.75	30	71	78
POSS+DPX-Y6202/water	.25G+1.5	69	93	97
POSS+water//DPX-Y6+water	.25G+.75	29	68	85
POSS+water//DPX-Y6+water	.25G+1.5	67	96	97
POSS+DPX-Y6/w//2,4-D-bee+w	.25G+.75+4	11	34	36
POSS+DPX-Y6/w//2,4-D-bee+w	.25G+1.5+4	40	80	88
DPX-Y6+2,4-D-bee/w//POSS+w	.75+4+.25G	14	23	39
DPX-Y6+2,4-D-bee/w//POSS+w	1.5+4+.25G	46	83	93
POSS+DPX-Y6+2,4-D-bee/water	.25G+.75+4	9	39	58
POSS+DPX-Y6+2,4-D-bee/water	.25G+1.5+4	45	75	91
POSS+DPX-Y6/w//2,4-D-dma+w	.25G+.75+4	26	51	50
POSS+DPX-Y6/w//2,4-D-dma+w	.25G+1.5+4	53	79	85
DPX-Y6+2,4-D-dma/w//POSS+w	.75+4+.25G	28	64	71
DPX-Y6+2,4-D-dma/w//POSS+w	1.5+4+.25G	62	89	88
POSS+DPX-Y6+2,4-D-dma/water	.25G+.75+4	30	48	53
POSS+DPX-Y6+2,4-D-dma/water	.25G+1.5+4	61	88	93
Mean		39	67	75
High mean		69	96	97
Low mean		9	23	36
Coeff. of variation		20	16	12
LSD(1 Percent)		15	20	17
LSD(5 Percent)		11	15	13
No. of reps		4	4	4

Summary

Mixing methods did not significantly influence grass species control with DPX-Y6202 alone or with 2,4-D. Grass control tended to be higher when 2,4-D-dma first was mixed with DPX-Y6202, then a portion of the water, and the final dilution obtained with emulsified POSS, compared to when POSS was first mixed with DPX-Y6202, then a portion of water before the final dilution with 2,4-D-dma in water. Grass control with DPX-Y6202 generally was antagonized more by 2,4-D-bee than 2,4-D-dma.

Mixing methods for sethoxydim, Fargo, 1984. Era wheat, Moore oats and Siberian millet were seeded in 6 foot wide strips on June 26. Treatments were applied on July 20 to the 5-leaf stage grass species. Evaluation was on August 7. The / lines indicate order of mixture and a double // line indicates mixing preemulsified materials.

Treatments	oz/A	--Percent control-- Oat	Wheat	Millet
POSS+Seth/water	.25G+1.5	73	65	88
POSS+Seth/water	.25G+3	93	92	95
POSS+water//Seth+water	.25G+1.5	82	81	85
POSS+water//Set+water	.25G+3	88	90	96
POSS+Seth/water//Bent+water	.25G+1.5+12	11	11	46
POSS+Seth/water//Bent+water	.25G+3+12	46	46	71
Seth+Bent/water//POSS+water	1.5+12+.25G	16	34	49
Seth+Bent/water//POSS+water	3+12+.25G	52	61	77
POSS+Seth+Bent/water	.25G+1.5+12	16	14	43
POSS+Seth+Bent/water	.25G+3+12	34	55	64
POSS+Seth/water//Desm+water	.25G+1.5+12	88	93	91
POSS+Seth/water//Desm+water	.25G+3+12	69	80	79
Seth+Desm/water//POSS+water	1.5+12+.25G	65	74	70
Seth+Desm/water//POSS+water	3+12+.25G	74	83	88
POSS+Seth+Desm/water	.25G+1.5+12	61	81	66
POSS+Seth+Desm/water	.25G+3+12	80	85	89
Mean		59	65	75
High mean		93	93	96
Low mean		11	11	43
Coeff. of variation		28	22	11
LSD(1 Percent)		31	27	15
LSD(5 Percent)		23	20	11
No. of reps		4	4	4

Summary

Wheat rating was difficult because of injury from apphids. Method of mixing did not greatly influence grass control with sethoxydim applied alone or in combination with bentazon or desmedipham. However, control tended higher when sethoxydim was mixed with bentazon first and when mixed with desmedipham last, averaged over species and sethoxydim rate.

Influence of water volume on herbicide activity, Fargo 1984. 'Era' wheat, 'Moore' oats and foxtail millet were seeded on June 26. The treatments were applied across 6 foot wide strips of each specie on July 20 with 70 F, mostly cloudy sky,30% relative humidity,and 5 to 10 mph SE wind to 4 to 5 leaf wheat and oats and 3 to 4 leaf millet. All treatments were applied at 35 psi with a bicycle wheel sprayer equipped with 8001 nozzles. One pass was used to obtain a spray volume of 8 gpa and two passes were used to obtain a volume of 16 gpa,thus droplet size remained contant. The experimental design was a randomized complete block with four replications. Control ratings were taken on July 27 and August 15.

Treatment	Rate oz/A	---- July 27 ---- --Percent injury-- Millet	Wheat	Oat	August 24 % injury Oat	Mil
Diclofop 8 gpa	16	25	0	16	40	73
Fluazifop+PO 8 gpa	3+.25G	41	33	50	99	48
Sethoxydim+PO 8 gpa	1+.25G	45	20	38	56	94
Sethoxydim+PO 8 gpa	2+.25G	45	40	38	83	98
Sethoxydim+PO 8 gpa	3+.25G	60	39	45	94	99
Diclofop 16 gpa	16	30	0	8	39	70
Fluazifop+PO 16 gpa	3+.25G	38	38	49	99	49
Sethoxydim+PO 16 gpa	1+.25G	51	26	30	48	93
Sethoxydim+PO 16 gpa	2+.25G	46	31	39	87	99
Sethoxydim+PO 16 gpa	3+.25G	45	34	43	96	98
Untreated	0	0	0	0	0	0
Mean		39	24	32	67	75
High mean		60	40	50	99	99
Low mean		0	0	0	0	0
Coeff. of variation		24	34	21	9	6
LSD(1 Percent)		18	15	13	11	8
LSD(5 Percent)		13	11	10	8	6
No. of reps		4	4	4	4	4

Summary

Control of the species increased with increasing sethoxydim rate. Control was similar whether diclofop, fluazifop and sethoxydim were applied in water volumes of 8 or 16 gpa.

Soil activity of postemergence grass herbicides, Fargo 1984. Treatments were applied to the soil surface on May 10 with 62 F, 45% relative humidity, clear sky, dry soil, and 5 to 10 mph W wind. 'Moore' oats were seeded May 10 (immediately after herbicide application) and June 26. The experimental design was a randomized complete block with 4 replications Percent stand reduction and injury were determined on July 17.

Treatment	Rate oz/A	Early seeded ---- Oat --- %sr1	%ir1	Late seeded --- Oat ---- %sr2	%ir2
Diclofop	16	31	20	5	0
Diclofop	32	54	38	36	14
Diclofop	64	83	59	29	19
Diclofop	128	94	70	60	18
Fenoxaprop	3	16	8	30	8
Fenoxaprop	6	33	13	33	11
Fenoxaprop	12	18	3	14	1
Fenoxaprop	24	33	11	9	4
Fluazifop-4	3	15	5	33	23
Fluazifop-4	6	14	5	5	0
Fluazifop-4	12	30	8	4	0
Fluazifop-4	24	55	31	16	0
Haloxyfop	3	9	5	6	9
Haloxyfop	6	35	20	9	3
Haloxyfop	12	83	45	26	10
Haloxyfop	24	97	72	65	21
DPX-Y6202	3	26	10	35	14
DPX-Y6202	6	35	10	23	10
DPX-Y6202	12	70	49	36	5
DPX-Y6202	24	81	30	29	5
Sethoxydim	3	54	14	29	8
Sethoxydim	6	55	26	40	10
Sethoxydim	12	78	38	53	19
Sethoxydim	24	93	49	80	66
Clopropoxydim	3	80	35	35	10
Clopropoxydim	6	88	52	21	8
Clopropoxydim	12	93	70	51	36
Clopropoxydim	24	99	97	91	71
Untreated check	0	0	0	0	0
Mean		53	31	31	14
High mean		99	97	91	71
Low mean		0	0	0	0
Coeff. of variation		31	49	63	102
LSD(1 Percent)		31	28	36	26
LSD(5 Percent)		23	21	28	20
No. of reps		4	4	4	4

Summary

Oat seeded immediately after herbicide application were generally injured more than oat seeded seven weeks later. Clopropoxydim and sethoxydim exhibited the highest level of soil activity at 3 and 6 oz/A. Haloxyfop, DPX-Y6202, sethoxydim and clopropoxydim at 12 and 24 oz/A all gave 70% or greater oat stand reductions.

Soil activity of postemergence grass herbicides, Prosper 1984. Treatments were applied to the soil surface on May 20 with 60 F, 50% relative humidity, clear sky, dry soil, and a 5 to 10 mph NW wind. 'Moore' oats were seeded May 20 (immediately after herbicide application)and June 14. The experimental design was a randomized complete block with 4 replications. Percent stand reduction and injury were determined on July 18.

Treatment	Rate oz/A	Early seeded ---- Oat --- %sr1	%ir1	Late seeded --- Oat ---- %sr2	%ir2
Diclofop	16	19	13	10	9
Diclofop	32	25	13	18	10
Diclofop	64	65	43	31	40
Diclofop	128	85	44	40	21
Fenoxaprop	3	0	1	1	1
Fenoxaprop	6	1	4	1	1
Fenoxaprop	12	9	11	8	6
FEnoxaprop	24	6	8	5	3
Fluazifop-4	3	6	8	1	4
Fluazifop-4	6	6	4	8	1
Fluazifop-4	12	23	11	6	13
Fluazifop-4	24	65	31	24	14
Haloxyfop	3	14	18	16	9
Haloxyfop	6	45	18	20	8
Haloxyfop	12	80	41	58	20
Haloxyfop	24	91	60	74	34
DPX-Y6202	3	0	1	10	8
DPX-Y6202	6	21	21	10	4
DPX-Y6202	12	5	10	8	11
DPX-Y6202	24	33	9	16	10
Sethoxydim	3	11	14	4	11
Sethoxydim	6	38	26	20	10
Sethoxydim	12	64	50	19	28
Sethoxydim	24	92	43	71	38
Clopropoxydim	3	49	29	3	13
Clopropoxydim	6	81	40	13	15
Clopropoxydim	12	98	76	53	38
Clopropoxydim	24	97	76	84	53
Untreated check	0	0	0	0	0
Mean		39	25	22	15
High mean		98	76	84	53
Low mean		0	0	0	0
Coeff. of variation		42	67	63	83
LSD(1 Percent)		30	31	25	23
LSD(5 Percent)		23	23	19	17
No. of reps		4	4	4	4

Summary

Oats seeded immediately after herbicide application were injured more than oats seeded four weeks later with all treatments. Clopropoxydim had the highest level of soil activity compared to the other treatments. Haloxyfop and sethoxydim at 24 oz/A caused over 90% reduction in oat stand. Very little soil activity was observed with all rates of fenoxaprop, DPX-Y6202, and fluazifop rates of 12 oz/A or less.

Chlorsulfuron soil residual from 1979, Fargo NW-22 1984. The plot area received chlorsulfuron at 1 to 4 oz/A applied at 10 weekly intervals from June 4 to August 6, 1979. Soybeans and lentils were seeded to the area on June 26, 1984 and evaluated in late August. The area was moldboard plowed in the fall of each year since the 1979 treatments. The 1979 experiment was a split plot with chlorsulfuron rate as main-plots and week of application the sub-plots. Evaluations were over the main plots and the range represents the highest and lowest stand reduction or injury rating for the sub-plots in the main plot.

Chlorsulfuron (oz/A)	July 1980 % Stand reduction Soybean	July 1980 % Stand reduction Sugarbeet	August 1981 % Stand reduction Soybean	August 1981 % Stand reduction Sugarbeet	July 1982 % Stand reduction Soybean	July 1982 % Stand reduction Sugarbeet
1	40-63	75-98	50-60	98-100	40-50	98-100
2	82-87	92-96	75-80	98-100	65-75	98-100
4	95-100	97-100	92-95	98-100	90-95	98-100

Chlorsulfuron oz/A	July 1983 % Stand reduction Soybean	July 1983 % Stand reduction Sugarbeet	July 1983 % injury Soybean	August 1984 % injury Soybean	August 1984 % injury Lentils
1	0	0	0	0	25-35
2	0	100	50-60	20-30	75-85
4	0	100	70-80	55-65	100

SUMMARY

Chlorsulfuron residual from 1 to 4 oz/A application in 1979 reduced sugarbeet stands 98 to 100 in 1982 regardless of the rate applied. Soybean stands were reduced similarily in 1982 as in 1980 and 81, except for a trend for less soybean stand reduction in 1982 from chlorsulfuron at 2 oz/A. Chlorsulfuron residues from 1979 applications were still present to injure soybeans and lentils in 1984. Sub-plots were only 6 feet wide, but interplot contamination was low as the untreated plots were easily distinguishable. The soil in the area has a pH of 8.2.

Rotational crop response to chlorsulfuron, Fargo 1982-1984. Herbicide treatments were applied to 'Era' wheat June 15, 1982. Strips of 'Park' barley, 'Moore' oats, Seed Tec '315' sunflower, 'Fleetwood' navy bean, Pioneer '3881' corn, 'Flor' flax, 'Chilean 78' lentils, and 'McCall' soybeans were seeded across each experimental unit on June 26, 1984 which is approximately two years after the herbicide application. Crop injury was evaluated on August 3. The experimental design was a randomized complete block with four replications.

Treatment	Rate oz/A	Oat	Bar	Flax	Lent	Navy	Soya	Corn	Snfl
		---------- Percent	injury	----------					
Control		0	0	0	0	0	0	0	0
Chlorsulfuron	0.06	0	0	0	9	0	0	0	0
Chlorsulfuron	0.12	0	0	0	53	9	19	39	21
Chlorsulfuron	0.18	0	0	0	44	5	0	44	14
Chlorsulfuron	0.25	0	0	26	80	26	25	74	41
Chlorsulfuron	0.37	0	5	58	89	50	61	88	70
Chlorsulfuron	0.5	0	0	15	75	47	39	87	43
Metsulfuron	0.12	0	6	14	61	13	18	10	18
Metsulfuron	0.25	0	3	10	63	15	16	14	78
Metsulfuron	0.5	0	0	31	88	68	68	81	99
Mean		0	1	15	56	23	24	44	38
High mean		0	6	58	89	68	68	88	99
Low mean		0	0	0	0	0	0	0	0
Coeff. of variation		0	348	90	14	68	49	29	37
LSD(1 Percent)		0	9	27	15	31	24	25	28
LSD(5 Percent)		0	7	20	11	23	18	19	21
No. of reps		4	4	4	4	4	4	4	4

Summary

Neither oats or barley were injured by soil residual of chlorsulfuron or metsulfuron two years after application. Lentils were severely injured when seeded into soil previously treated with chlorsulfuron or metsulfuron at 0.12 oz/A or greater. Crop response in order of most to least tolerant to soil residual of chlorsulfuron was barley=oat, flax, navy bean, soybean, sunflower, corn, and lentils. No injury was observed when the crops were seeded into areas previously treated with chlorsulfuron at 0.06 oz/A.

Rotational crop response to extended weed control rates of chlorsulfuron and metsulfuron, Fargo, 1982-1984. Herbicide treatments were applied to 'Era' wheat June 15,1982. Strips of 'Park' barley, 'Moore' oats, Seed Tec '315' sunflower, 'Fleetwood' navy bean, Pioneer '3881' corn, 'Flor flax, 'Chilean 78' lentils, and 'McCall ' soybeans were weeded across each experimental unit on June 26, 1984 which is approximately two years after the herbicide application. Crop injury was evaluated on August 3. The experimental design was a randomized complete block with four replications.

Treatment	Rate lb/A	Bar	Oat	Flax	Lent	Navy	Soya	Corn	Snfl
		Percent injury							
Control		0	0	0	0	0	0	0	0
Control-tilled		0	0	0	0	0	0	0	0
Chlorsulfuron	0.25	0	0	54	83	58	54	86	55
Chlorsulfuron	0.5	0	0	85	95	73	71	96	77
Chlorsulfuron	0.75	0	0	66	97	86	80	98	96
Chlorsulfuron	1.0	0	0	96	99	86	84	99	96
Chlorsulfuron	1.5	0	0	94	99	90	95	99	99
Metsulfuron	0.5	0	0	70	99	81	81	93	99
Metsulfuron	1.0	0	39	81	99	96	94	97	99
Mean		0	4	61	74	63	62	74	69
High mean		0	39	96	99	96	95	99	99
Low mean		0	0	0	0	0	0	0	0
Coeff. of variation		0	102	41	9	17	15	7	24
LSD(1 Percent)		0	9	49	13	21	18	10	32
LSD(5 Percent)		0	6	36	10	16	13	8	24
No. of reps		4	4	4	4	4	4	4	4

Summary

Barley was not injured when seeded into soil previously treated with chlorsulfuron or metsulfuron. Oats were injured only when seeded into soil previously treated with metsulfuron at 1.0 oz/A. The remaining crop species were severely injured when seeded into soil previously treated with all rates of chlorsulfuron or metsulfuron.

<u>Leafy spurge control screening trials with various herbicides and herbicide combinations</u>. Lym, Rodney G. and Calvin G. Messersmith. Three experiments to evaluate several herbicides for leafy spurge control were established on 10 June 1983 in a pasture near Sheldon, ND. The herbicides were applied using a tractor sprayer delivering 8.5 gpa at 35 psi. All plots were 10 by 30 ft in a randomized complete block design with four replications. The leafy spurge was beginning to flower and 12 to 18 inches tall. Evaluations are based on percent stand reduction as compared to the control, and data are shown in the table.

In general, no evaluated compounds except picloram provided satisfactory leafy spurge control. UC-77179 did not control leafy spurge, but did cause grass injury one year after application. All grass top growth was killed with UC-77179 the year of application (data not shown). Fenac + dicamba has been reported as more toxic to various *Euphorbia* spp. than dicamba alone. However, fenac + dicamba was not more toxic to leafy spurge than dicamba alone in this experiment.

Previous research at North Dakota State University has shown that amitrole alone provides inadequate leafy spurge control, but does translocate in the plant as evidenced by inhibition of chlorophyll formation in new stem growth from the root. Picloram was applied with amitrole in the third experiment in an effort to increase picloram translocation into the leafy spurge root system. Leafy spurge regrowth in plots treated with picloram plus amitrole lacked chlorophyll one year after application, but plant density was similar to plots treated with picloram alone. Also, grass injury from amitrole would prohibit use in pasture and rangeland. (Cooperative investigation Dept. of Agron. and ARS, U.S. Dept. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo).

Table. Leafy spurge control by various herbicides and herbicide combinations. (Lym and Messersmith).

Treatment	Rate	June 1984 Control	June 1984 Grass Injury	August 1984 Control	August 1984 Grass Injury
	(lb/A)	----------	----------	(%) ----------	----------
Experiment 1					
UC-77179	2.0	7	0	0	0
UC-77179	3.0	0	30	0	20
UC-77179	4.0	0	67	0	50
Picloram	2.0	94	0	90	0
LSD (0.05)		12	43	10	34
Experiment 2					
Fenac + dicamba	1.0+3.0	14	0		
Fenac + dicamba	2.0+2.0	10	0		
Fenac + dicamba	3.0+1.0	9	0		
Dicamba	3.0	21	0		
Dicamba	8.0	62	0		
LSD (0.05)		18			
Experiment 3					
Amitrole+picloram	1.25+0.5	34	10	13	5
Amitrole+picloram	2.5+0.5	38	25	25	18
Amitrole+picloram	5.0+0.5	50	75	23	45
Amitrole+picloram	1.25+1.0	73	12	34	3
Amitrole+picloram	2.5+1.0	79	30	31	20
Amitrole+picloram	5.0+1.0	74	72	35	53
Picloram	0.5	40	0	18	0
Picloram	1.0	64	0	28	0
Amitrole	5.0	25	63	16	57
LSD (0.05)		27	16	25	22

<u>Spring or fall applied granular picloram and dicamba for leafy spurge control</u>. Lym, Rodney G. and Calvin G. Messersmith. Granular and liquid formulations of picloram and dicamba were compared for leafy spurge control in two experiments established in 1980 on 25 June and 3 September near Valley City. An experiment to compare liquid and granular picloram in a sandy soil was established on 11 June 1980 in the Sheyenne National Grasslands near McLeod, ND. Six experiments to compare picloram 2% and 10%G formulations were established on 14 September 1982 and 10 June 1983 near Sheldon, ND, 9 September 1982, 21 June 1983, and 13 June 1984 near Dickinson, and 14 June 1984 in the Sheyenne National Grasslands. Blank pellets were included in the experiments conducted at Sheldon so the number of pellets applied per plot was similar and to insure uniform distribution of the piclorm 10%G formulation. All experiments were in a randomized complete block design with four replications and 10 by 30 ft plots. The granules were applied uniformly by hand, while the liquid formulations were applied with a tractor mounted sprayer at 8.5 gpa and 35 psi. Evaluations were based on percent stand reduction compared to the control. A significant interaction between site and treatments occurred, so experimental sites will be discussed individually.

Leafy spurge control with picloram and dicamba was better from fall than spring applied treatments at Valley City, especially when evaluated 24 and 48 months after treatment (Table 1). The control averaged across all treatments after 24 and 48 months was 54 and 22% for spring applications and 78 and 62% for fall applications, respectively. Fall applied dicamba at 8.0 lb/A and picloram at 2 lb/A as liquids provided similar control after four years, but control with granular picloram was better than with granular dicamba. Dicamba and picloram applied in the spring of 1980, generally did not give satisfactory leafy spurge control by 1982 and 1983, respectively. The exception was picloram at 2.0 lb/A which provided satisfactory control until 1984. Only picloram 2%G at 1.5 and 2.0 lb/A fall applied provided satisfactory leafy spurge control after 48 months at 83 and 86%, respectively.

Picloram 2S and 2%G at equal rates provided similar leafy spurge control over a 50 month period when evaluated on the sandy soil of the Sheyenne National Grasslands (Table 2). Picloram 2S and 2%G provided 87 and 85% control in May, 1983, respectively, but control decreased to 70 and 63%, respectively, by June 1984.

Picloram 2%G and 10%G at equal rates generally provided similar leafy spurge control at both Sheldon and Dickinson (Table 3). Fall applications of picloram 2%G and 10%G at all application rates except 2.0 lb/A, provided better leafy spurge control after 9 months than spring applications after 3 months. This difference could be due to insufficient moisture to completely disperse the granules following the June application, because the treatments generally were similar 12 months after application.

Leafy spurge control with picloram 10%G at 1.0 and 2.0 lb/A was similar to picloram 2%G at 1.0 and 2.0 lb/A when blanks were added, but much worse when 10%G pellets alone were applied (Table 3). Since 80% fewer pellets per acre are applied with picloram 10%G than with 2%G, uniform distribution with hand-held application equipment is difficult which probably accounted for the decreased control. Visible grass injury was negligible with either picloram formulation. In general, leafy spurge control with picloram at 2.0 lb/A declined more rapidly when the 2S formulation was used compared to 2%G or 10%G.

Similar experiments were begun in 1984 using a new formulation of picloram 10%G with smaller pellets which resulted in more pellets per square foot than the previous 10%G formulation at similar rates. Picloram 10%G gave similar leafy spurge control to the 2%G formulation even though blanks were not mixed with the new 10%G formulation at the Sheyenne National Grasslands (Table 3). Control was much lower at Dickinson than at Sheyenne which again was probably due to insufficient moisture to completely disperse the granules.

Granular and liquid formulations of dicamba and picloram generally provided similar control at comparable rates. Picloram 2%G and 10%G provided similar leafy spurge control when blanks were included with the 10%G pellets or the number of pellets per square foot was increased by use of a smaller pellet. (Cooperative investigation by Dept. of Agron. and ARS, U.S. Dept. of Agric. Published with the approval of the Agric. Exp. Sta., North Dakota State Univ., Fargo.)

Table 1. Spring and fall applied granular picloram and dicamba for leafy spurge control at Valley City, ND. (Lym and Messersmith).

		Application and evaluation date															
		Spring treatment (25 June 1980)								Fall treatment (3 Sept 1980)							
Herbicide	Rate	6-81	9-81	6-82	9-82	6-83	9-83	6-84	9-84	6-81	9-81	6-82	9-82	6-83	9-83	6-84	9-84
	(lb/A)	(% control)															
Picloram 2%G	1.0	97	80	53	25	44	22	10	8	95	86	84	55	76	52	51	52
Picloram 2%G	1.5	98	89	87	22	77	38	29	26	99	100	100	96	98	97	87	83
Picloram 2%G	2.0	99	98	90	53	85	72	56	62	100	100	99	100	100	98	93	86
Dicamba 5%G	4.0	74	55	9	3	4	0	4	0	94	74	43	31	31	29	18	20
Dicamba 5%G	6.0	82	54	25	3	16	5	4	3	96	99	89	58	55	55	41	40
Dicamba 5%G	8.0	91	75	45	19	29	6	5	6	99	100	98	83	84	78	66	67
Picloram 2S	2.0	100	99	98	90	94	79	64	71	100	100	100	100	98	94	79	78
Dicamba 4S	8.0	94	74	28	12	42	13	7	5	99	99	100	97	92	83	69	72
LSD (0.05)		9	14	21	17	20	11	11	12	3	10	22	29	24	24	29	23

Table 2. Leafy spurge control using picloram liquid and granules in a sandy soil in the Sheyenne National Grasslands. (Lym and Messersmith).

Herbicide		Evaluation date							
formulation	Rate	May 81	Aug 81	May 82	Aug 82	May 83	Aug 83	June 84	Aug 84
	(lb/A)	(% control)							
Picloram 2S	0.5	73	13	3	1	0	0	0	5
Picloram 2S	1.0	98	73	24	25	15	9	13	28
Picloram 2S	2.0	100	99	94	88	87	34	70	45
Picloram 2%G	0.5	53	5	0	0	0	0	0	3
Picloram 2%G	1.0	97	72	23	14	14	8	20	10
Picloram 2%G	2.0	100	98	90	89	85	43	63	56
LSD (0.05)		25	12	14	12	15	8	18	35

Table 3. Leafy spurge control using picloram 2%G, 10%G and 2S as spring or fall applied treatment. (Lym and Messersmith).

Picloram formulation	Rate	Location and evaluation date							
		Sheldon				Dickinson			
		1983		1984		1983		1984	
		June	Aug	June	Aug	June	Aug	June	Aug
	(lb/A)	(% control)							
Applied Fall 1982									
2%G+blanks	0.5	66	26	8	21	38	5	18	5
2%G+blanks	1.0	86	41	29	33	69	15	42	13
2%G+blanks	1.5	87	67	48	48	90	37	71	51
2%G	2.0	99	76	80	66	96	53	79	64
10%G+blanks	0.5	39	11	3	31	34	9	19	0
10%G+blanks	1.0	83	60	52	56	84	21	45	36
10%G+blanks	1.5	81	60	43	58	88	35	55	47
10%G+blanks	2.0	87	63	77	56	89	40	75	64
10%G	1.0	53	26	11	13	..	..	..	..
10%G	2.0	89	61	45	45	..	..	..	..
Liquid (2S)	2.0	94	67	55	44	94	42	60	41
LSD (0.05)		16	30	19	23	18	28	30	33
Applied Spring 1983									
2%G+blanks	0.5	..	28	27	10	..	38	28	12
2%G+blanks	1.0	..	38	58	13	..	57	53	43
2%G+blanks	1.5	..	86	95	36	..	62	83	60
2%G	2.0	..	97	94	69	..	76	89	65
10%G+blanks	0.5	..	26	11	6	..	25	20	2
10%G+blanks	1.0	..	54	61	16	..	32	42	23
10%G+blanks	1.5	..	74	70	26	..	78	75	56
10%G+blanks	2.0	..	92	92	56	..	63	76	70
Liquid (2S)	2.0	..	93	79	39	..	96	94	51
LSD (0.05)			22	14	14		23	19	29
		Sheyenne				Dickinson			
Applied Spring 1984									
2%G	0.5	..	..	..	83	..	..	..	0
2%G	1.0	..	..	..	96	..	..	..	38
2%G	1.5	..	..	..	96	..	..	..	43
2%G	2.0	..	..	..	98	..	..	..	83
10%G	0.5	..	..	..	64	..	..	..	3
10%G	1.0	..	..	..	95	..	..	..	31
10%G	1.5	..	..	..	97	..	..	..	56
10%G	2.0	..	..	..	97	..	..	..	72
Liquid (2S)	2.0	..	..	..	98	..	..	..	98
LSD (0.05)		..	..	..	8	..	..	..	23

Mowing as a pretreatment for leafy spurge control with herbicides. Lym, Rodney G. and Calvin G. Messersmith. Previous research has shown that annual mowing of leafy spurge tends to increase forage production and delay leafy spurge maturity. Leafy spurge mowed in mid-summer begins to have vigorous regrowth and starts to flower and set seed, whereas unmowed plants generally have leafless mature stems with 4 to 6 inch branches of new growth near the tip. Two experiments were established to evaluate mowing as a pretreatment to fall herbicide application for leafy spurge control in a pasture near Sheldon, ND. Plots were mowed on 2 August 1983 and picloram at 1.0 lb/A or 2,4-D at 2.0 lb/A were applied on 11 August, 18 August or 6 September 1983 in the first experiment. The leafy spurge was dormant prior to mowing, but regrowth ranged from 2 to 3 inches tall on 11 August to flowering and 20 to 26 inches tall on 6 September. Plots were mowed on 2 August, 18 August or 6 September 1983 with all herbicide treatments applied on 22 September 1983 in the second experiment. Leafy spurge ranged from 24 inches tall, flowering and beginning seed set in plots mowed on 2 August to only 2 inches tall with few stems in plots mowed on 6 September. The plots were mowed with a rotary mower and herbicides were applied with a tractor sprayer delivering 8.5 gpa at 35 psi. All plots were 10 by 30 ft in a randomized complete block design with four replications. Air temperature was 84, 82, 71 and 46 F when herbicides were applied on 11 August, 18 August, 6 September and 22 September, respectively. Evaluations are based on percent stand reduction as compared to the control, and data are shown in the table.

Leafy spurge control with picloram applied 16 and 35 days after mowing was similar to control of unmowed plants (Table). However, control 9 months after application decreased 55% when picloram was applied only 9 days after mowing, probably due to the limited leafy spurge regrowth. Leafy spurge control with 2,4-D was 31 and 29% when applied to unmowed plants or 35 days after mowing, respectively. Control was only 3 and 6% when 2,4-D was applied 9 and 16 days after mowing, respectively. Mowing did not affect leafy spurge control one year after treatment. Leafy spurge control with picloram in the second experiment was similar regardless of mowing date or no mowing. However, leafy spurge control with 2,4-D increased to 33 and 14% when applied 51 days after mowing compared to 10 and 6% with no mowing when evaluated 9 and 12 months after application, respectively. No other mowing date affected leafy spurge control with 2,4-D. Mowing alone tended to decrease leafy spurge density slightly with all mowing dates. In general, leafy spurge control was not improved by a mowing pretreatment regardless of the mowing or herbicide application date. (Cooperative investigation Dept. of Agron. and ARS, U.S. Dept. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo).

Table. Leafy spurge control with picloram and 2,4-D applied on several dates following mowing as a pretreatment. (Lym and Messersmith).

Treatment	Rate	Days after mowing	Control 1984 June	Control 1984 August
	(lb/A)		---------- % ----------	
Experiment 1 (mowed 2 Aug 83)				
Mow + picloram (11 Aug)	1.0	9	42	6
Mow + 2,4-D (11 Aug)	2.0	9	3	5
Mow + picloram (18 Aug)	1.0	16	94	27
Mow + 2,4-D (18 Aug)	2.0	16	6	8
Mow + picloram (6 Sept)	1.0	35	88	25
Mow + 2,4-D (6 Sept)	2.0	35	29	6
Picloram (6 Sept)	1.0	..	97	30
2,4-D (6 Sept)	2.0	..	31	3
Mow only	...	..	7	0
LSD (0.05)			23	12
Experiment 2 (treated 22 Sept 83)				
Mow (2 Aug) + picloram	1.0	51	96	22
Mow (2 Aug) + 2,4-D	2.0	51	33	14
Mow (18 Aug) + picloram	1.0	35	91	30
Mow (18 Aug) + 2,4-D	2.0	35	18	2
Mow (6 Sept) + picloram	1.0	16	94	17
Mow (6 Sept) + 2,4-D	2.0	16	1	0
Mow (2 Aug 83)	...	..	5	2
Mow (18 Aug 83)	...	..	5	5
Mow (6 Sept 83)	...	..	3	4
Picloram	1.0	..	99	21
2,4-D	2.0	..	10	6
LSD (0.05)			16	8

<u>Dikegulac sodium in combination with 2,4-D and picloram for leafy spurge control in rangeland</u>. Lym, Rodney G. and Calvin G. Messersmith. Previous studies have shown dikegulac sodium (trade name Atrinal by Maag Agrochemicals, Vera Beach, Florida) to be synergistic with 2,4-D and picloram on leafy spurge. Dikegulac sodium causes temporary inhibition of plant growth, reduction or elimination of flowering and promotion of axillary plant growth. Dikegulac sodium activity on leafy spurge decreases as the plant matures. The purpose of these experiments was to evaluate the synergism of dikegulac sodium with picloram or 2,4-D in the field both as a tank-mix and split application.

The experiments were established at Lisbon, ND in an unused quarry with a heavy infestation of leafy spurge. The first two experiments were established on 26 May 1982 when the leafy spurge was in the yellow bract growth stage and before true flower initiation. The weather was partly cloudy, 76 F and 67% relative humidity with a soil temperature of 76 and 65 F at 1 and 4 inches, respectively. The plots were 10 by 30 feet, and treatments were replicated four times in a randomized complete block design. The treatments were applied in 8.5 gpa at 35 psi. Evaluations were based on percent stand reduction as compared to the control.

Dikegulac sodium at 0.5, 1.0 and 2.0 lb/A was applied alone and a tank-mixed with picloram at 1.0 or 2.0 lb/A and 2,4-D at 2.0 lb/A in the first experiment. Leafy spurge plants treated with dikegulac sodium alone were stunted one month after application, with many axillary branches and most flowers had been aborted. In general, the number of axillary branches increased as the dikegulac sodium rate increased. By the end of the growing season plants treated with dikegulac sodium at 2 lb/A still had many axillary branches but plants treated at the lower rates had resumed normal growth. Leafy spurge control was increased when picloram at 1.0 lb/A was applied with dikegulac sodium (Table 1). Leafy spurge control was 19 and 26% 15 and 29 months following application of picloram at 1.0 lb/A, respectively, alone but averaged 73 and 61% respectively, when tank-mixed with 0.5, 1.0, or 2.0 lb/A of dikegulac sodium. Dikegulac sodium tank-mixed with picloram at 2.0 lb/A or 2,4-D did not increase leafy spurge control compared to the herbicides applied alone.

Dikegulac sodium was applied as a tank-mix or split treatment with picloram and 2,4-D in the second experiment. Dikegulac sodium alone at 0.5 and 1.0 lb/A was applied on 26 May 1983. Picloram or 2,4-D at 1.0 lb/A were applied on 30 June 1983, as a split treatment alone or as a tank-mix treatment with dikegulac sodium. The weather was clear with 76 F, 69% relative humidity and a soil temperature of 80 and 76 F at 1 and 4 inches, respectively. The leafy spurge was in the true flower growth stage and beginning seed set. Dikegulac sodium had no observable effect on leafy spurge when applied later in the growing season. However, leafy spurge control with picloram at 1.0 lb/A increased slightly when dikegulac sodium was used as a pretreatment or a tank-mix compared to picloram applied alone (Table 2). Leafy spurge control with 2,4-D was not affected by dikegulac sodium.

The third experiment was similar to the second experiment with dikegulac sodium alone applied on 7 September 1982 and 2,4-D or picloram applied on 4 October 1982 either alone for the split treatments or tank-mixed with dikegulac sodium. On 7 September the sky was partly cloudy with 78 F and 80% relative humidity, the soil was dry and leafy spurge was under moisture stress. On 4 October the temperature was 57 F with 45% relative humidity and the leafy spurge was red and yellow with slight frost damage. Dikegulac sodium alone did not affect leafy spurge growth or control with picloram and 2,4-D when applied as a fall treatment to mature plants (Table 3).

Dikegulac sodium was very active on leafy spurge early in the growing season before flower initiation, as indicated by increased axillary branching, flower abortion and stem shortening, but had little effect on more mature plants. Leafy spurge control increased when dikegulac sodium at 0.5 to 2.0 lb/A was applied with picloram at 1.0 lb/A compared to picloram alone. (Cooperative investigation Dept. of Agron. and ARS, U.S. Dept. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State University, Fargo.)

Table 1. Leafy spurge control with 2,4-D or picloram applied alone or with dikegulac sodium on 26 May 1982 near Lisbon, ND. (Lym and Messersmith).

Treatment	Rate	Control			
		1983		1984	
		1 June	22 August	5 June	5 Oct
	(lb/A)	(%)			
Dikegulac sodium+picloram	0.5+1.0	92	70	64	60
Dikegulac sodium+picloram	0.5+2.0	100	90	68	63
Dikegulac sodium+picloram	1.0+1.0	91	60	76	61
Dikegulac sodium+picloram	1.0+2.0	100	83	87	85
Dikegulac sodium+picloram	2.0+1.0	96	68	78	73
Dikegulac sodium+picloram	2.0+2.0	99	94	90	89
Dikegulac sodium+2,4-D	0.5+2.0	15	3	3	3
Dikegulac sodium+2,4-D	1.0+2.0	15	3	0	0
Dikegulac sodium+2,4-D	2.0+2.0	2	0	0	0
Dikegulac sodium	0.5	1	0	0	0
Dikegulac sodium	1.0	0	0	0	0
Dikegulac sodium	2.0	2	0	0	0
Picloram	1.0	90	19	27	26
Picloram	2.0	96	98	72	75
2,4-D	2.0	12	0	0	0
LSD (0.05)		13	15	21	23

Table 2. Leafy spurge control with 2,4-D or picloram applied with dikegulac sodium as a pretreatment or tank mix on 26 May and 30 June 1982, respectively, in Lisbon, ND. (Lym and Messersmith).

Treatment	Rate	Control	
		1 June 1983	22 August 1982
	(lb/A)	(%)	
Dikegulac sodium	0.5	0	0
Dikegulac sodium	1.0	7	0
Picloram	1.0	90	9
2,4-D	1.0	14	0
Dikegulac sodium+picloram (split)	0.5+1.0	94	19
Dikegulac sodium+picloram (split)	1.0+1.0	92	16
Dikegulac sodium+picloram (tank mix)	0.5+1.0	95	18
Dikegulac sodium+picloram (tank mix)	1.0+1.0	82	9
Dikegulac sodium+2,4-D (split)	0.5+1.0	4	0
Dikegulac sodium+2,4-D (split)	1.0+1.0	4	0
Dikegulac sodium+2,4-D (tank mix)	0.5+1.0	1	0
Dikegulac sodium+2,4-D (tank mix)	1.0+1.0	9	0
LSD (0.05)		14	10

Table 3. Leafy spurge control with 2,4-D or picloram applied with dikegulac sodium as a pretreatment or tank mix on 7 September and 4 October 1982, respectively, in Lisbon, ND. (Lym and Messersmith).

Treatment	Rate	Control	
		1 June 1983	22 August 1983
	(lb/A)	(%)	
Dikegulac sodium+picloram (tank mix)	0.5+1.0	72	1
Dikegulac sodium+picloram (tank mix)	1.0+1.0	52	4
Dikegulac sodium+picloram (split)	0.5+1.0	47	0
Dikegulac sodium+picloram (split)	1.0+1.0	64	8
Dikegulac sodium+2,4-D (tank mix)	0.5+2.0	2	0
Dikegulac sodium+2,4-D (tank mix)	1.0+2.0	2	0
2,4-D	2.0	4	0
Picloram	1.0	57	8
LSD (0.05)		20	3

Dikegulac sodium activity on leafy spurge alone and in combination with 2,4-D and picloram. Lym, Rodney G. and Calvin G. Messersmith. Dikegulac sodium is manufactured as Atrinal (Tradename) by Maag Agrochemicals, Vero Beach, Florida. It is applied as a foliar spray and is translocated throughout the plant to meristematic zones. At appropriate concentrations, dikegulac sodium causes temporary inhibition of plant growth, reduces or eliminates apical dominance, promotes growth or axillary buds and inhibits flowering and fruit set of certain plant species. The purpose of these experiments was to determine the effects of dikegulac sodium on leafy spurge grown in the greenhouse.

Dikegulac sodium was applied to leafy spurge in the first experiment at solution concentrations ranging from 0.10 to 0.62% (v:v) in water with a hand held mist sprayer to the point of run-off. The leafy spurge plants had approximately equal root mass and were 3 to 4 inches tall with one stem/pot. The numbers of branches on shoots, shoots from roots and root buds were counted 8 weeks after treatment and the roots were replanted to observe the number of new shoots from roots for 5 weeks after replanting. The emerged shoots were counted and then removed to stimulate more stem development from root buds.

Four weeks after treatment all treated plants showed profuse branching from the main stem regardless of application rate. Eight weeks after treatment the plants were still 3 to 4 inches tall, with numerous branches and resembled pompons in appearance.

Dikegulac sodium at concentrations of 0.31, 0.46 and 0.62% (v:v) increased the number of branches on leafy spurge stems by 8 to 11 times (Table 1). All dikegulac sodium concentrations inhibited shoot development from roots, but treated and untreated leafy spurge plants did not differ significantly for number of root buds. Dikegulac sodium at 0.46 and 0.62% decreased the number of leafy spurge shoots arising from the roots two weeks after the topgrowth was removed. All the treatments except the 0.10% treatment caused at least some of the new shoots to be multi-branched, which may indicate that dikegulac sodium was translocated at least partially in the leafy spurge root system. The multi-branching was not observed in new shoots arising from the roots after 3 or more weeks.

Dikegulac sodium was applied to leafy spurge in the second and third experiments in the pre-flowering and flowering stages of growth. A range of dikegulac sodium rates from 0.05 to 0.78% (v:v) were used. The remainder of the experiment was conducted as in experiment one, except the plants were allowed to grow for six weeks after treatment before the number of branches on shoots was counted. Then the topgrowth was removed to soil level for 8 to 10 more weeks. The number of emerged shoots were counted and then removed to stimulate stem development from root buds.

In general dikegulac sodium was less active on more mature leafy spurge. Dikegulac sodium increased branching on leafy spurge stems in the bud stages, but only at the 0.78% concentration (Table 2). New shoots arising from the roots were not affected. Treatment of dikegulac sodium did not affect the number of branches on shoots or shoots from the roots on flowering leafy spurge (Table 3). However, some new shoots from the roots showed increased branching on the stem with all concentrations except 0.05%, thus demonstrating translocation of dikegulac sodium.

Dikegulac sodium was applied to leafy spurge in the next experiments as a 24 hr pretreatment to and as a tank mix with the herbicides picloram and 2,4-D. Each herbicide was a separate experiment. The leafy spurge had been grown in 6 inch diameter pots for 9 months and then cut back to soil level 4 weeks before treatment. The leafy spurge was 10 to 14 inches tall and in a vegetative growth stage at treatment. The treatments were applied with a moving nozzle pot sprayer delivering 17.5 gpa at 35 psi. The experiments were a randomized complete block with four replications. Plants were evaluated for injury 3, 4 and 28 days after treatment on a scale from 0 to 100 with 0 indicating no injury and 100 indicating complete burn down.

A tank-mix of dikegulac sodium plus picloram caused a rapid burning of the treated leaves and much faster injury than either a pretreatment of dikegulac sodium followed by picloram, or picloram used alone (Table 4). The tank-mix and pretreatment applications showed similar leafy spurge injury after 28 days and both were more injurious to leafy spurge than picloram alone. Tank-mixing dikegulac sodium with 2,4-D resulted in greater injury to leafy spurge than either a pretreatment of dikegulac sodium or 2,4-D alone. Injury was highest at the 2 and 4 oz/A rate of dikegulac sodium tank-mixed with 2,4-D but decreased at the 8 oz/A rate.

Dikegulac sodium applied to young leafy spurge caused the plant to stop growing in height and to develop a large number of branches from the main stem. Dikegulac sodium had a slight effect on leafy spurge in the bud stage of growth, but did not affect the morphology of flowering leafy spurge. The plant growth regulator was translocated in the leafy spurge root system. Herbicide injury to leafy spurge was increased when dikegulac sodium was tank-mixed with 2,4-D and picloram.

Table 1. Effect of dikegulac sodium on young leafy spurge plants. (Lym and Messersmith).

Dikegulac sodium concentration	Branches on shoots	Shoots from roots	Root buds	New shoots from roots (weeks)			
				2	3	4	5
(%)	(No./plant)	(No./plant)	(No.)				
0.10	2	2	10	7	1	4	3
0.33	8	2	2	6	1	2	2
0.31	20	2	7	6	2	1	2
0.46	16	2	1	1	0	0	0
0.62	23	1	6	2	2	2	1
0	2	5	8	8	1	2	2
LSD (0.05)	8	2	8	4	2	4	3

[a] Dikegulac sodium (Atrinal) in water (v:v).

Table 2. Effect of dikegulac sodium on leafy spurge in the bud stage. (Lym and Messersmith).

Dikegulac sodium concentration	Branches on shoots	Shoots from roots	New shoots from roots (weeks) 2	3	4	6	8	10
(%)	(No./plant)	(No./plant)						
0.05	3	4	7	10	19	11	13	2
0.23	8	3	2	7	8	11	7	2
0.46	10	3	3	7	12	14	5	0
0.62	13	4	3	6	9	12	4	2
0.78	29	3	2	8	13	9	8	5
0	5	3	1	7	4	9	5	5
LSD (0.05)	16	3	6	5	9	7	9	4

[a] Dikegulac sodium (Atrinal) in water (v:v).

Table 3. Effect of dikegulac sodium on flowering leafy spurge. (Lym and Messersmith).

Dikegulac sodium concentration	Branches on shoots	Shoots from roots	New shoots from roots (weeks) 2	3	4	6	8
(%)	(No./plant)	(No./plant)					
0.05	4	7	2	9	9	4	11
0.23	5	6	3	7	7	6	16
0.46	6	3	2	7	10	4	15
0.62	7	4	3	8	8	6	15
0.78	6	2	2	4	6	4	18
0	5	5	2	4	6	4	13
LSD (0.05)	4	6	3	5	7	5	7

[a] Dikegulac sodium (Atrinal) in water (v:v).

Table 4. Effect of dikegulac sodium in combination with picloram and 2,4-D as split or tank-mix treatments on leafy spurge. (Lym and Messersmith).

Treatment	Rate	Injury		
		3 days	14 days	28 days
	(oz/A)			
Dikegulac sodium+picloram (split)	2+2	3	20	45
Dikegulac sodium+picloram (split)	4+2	8	20	35
Dikegulac sodium+picloram (split)	8+2	22	28	43
Dikegulac sodium+picloram (tank mix)	2+2	18	25	40
Dikegulac sodium+picloram (tank mix)	4+2	30	30	43
Dikegulac sodium+picloram (tank mix)	8+2	48	50	60
Picloram	2	13	18	30
LSD (0.05)	---	12	10	11
Dikegulac sodium+2,4-D (split)	2+8	38	25	38
Dikegulac sodium+2,4-D (split)	4+8	30	25	33
Dikegulac sodium+2,4-D (split)	8+8	48	33	30
Dikegulac sodium+2,4-D (tank mix)	2+8	75	73	78
Dikegulac sodium+2,4-D (tank mix)	4+8	78	75	88
Dikegulac sodium+2,4-D (tank mix)	8+8	48	40	50
2,4-D	8	15	20	20
LSD (0.05)	---	16	22	21

[a] Dikegulac sodium was applied 24 hours before herbicides with split.

Picloram and 2,4-D combination treatments for long-term leafy spurge management. Lym, Rodney G. and Calvin G. Messersmith. Picloram is an effective herbicide for leafy spurge control especially when applied at rates from 1 to 2 lb/A. However, the high cost of picloram at 2 lb/A makes it uneconomical to treat large acreages in pasture and rangeland weed control programs. Research by North Dakota State University has suggested that picloram at 0.25 to 0.5 lb/A applied annually will give satisfactory leafy spurge control after 3 to 5 years. The purpose of this experiment is to establish the number of annual applications of picloram needed to provide 90 to 100% control of leafy spurge and to investigate possible synergism between picloram and 2,4-D.

The experiment was established at three locations in North Dakota and began on 25 August 1981 at Dickinson, 1 September 1981 at Sheldon and on 11 June 1982 at Valley City. The soil at Dickinson was a loamy fine sand with pH 7.2 and 0.6% organic matter, at Sheldon was a silty clay loam with pH 5.8 and 3.4% organic matter, and at Valley City was loam with pH 6.0 and 3.3% organic matter. Dickinson, located in western North Dakota, generally receives much less precipitation than the other two sites located in eastern North Dakota. All treatments were applied annually except 2,4-D alone which was applied biannually (both spring and fall). Picloram treatments were applied in late August 1981 and in June of 1982 through 1984. Thus, the Dickinson and Sheldon sites have received four picloram and picloram plus 2,4-D treatments and seven 2,4-D treatments, while the Valley City site has received three and six treatments, respectively. The plots were 10 by 30 ft and each treatment was replicated four times in a randomized complete block design at all sites. Evaluations were based on percent stand reduction as compared to the control.

Picloram at 0.25, 0.375 and 0.5 lb/A provided 48, 52 and 81% leafy spurge control, respectively, after four treatments when averaged across the Dickinson and Sheldon locations (Table). Control had gradually increased for the picloram at 0.5 lb/A treatment, but not the 0.25 or 0.375 lb/A treatments when compared to the August 1982 and 1983 evaluations. 2,4-D alone provided between 26 and 38% control of leafy spurge after biannual applications for four years.

Leafy spurge control tended to increase when 2,4-D was applied with picloram at 0.25 or 0.375 lb/A (Table). Leafy spurge control in August 1984 increased an average of 19 and 22% with picloram at 0.25 or 0.375 lb/A plus 2,4-D at 1.0 to 2.0 lb/A, respectively, when compared to the same picloram rate applied alone. Picloram at 0.5 lb/A plus 2,4-D provided 80 to 84% leafy spurge control and was similar to picloram at 0.5 lb/A alone at 81%. The greatest enhancement with 2,4-D plus picloram seems to be with 2,4-D at 1.5 lb/A or less and picloram at 0.375 lb/A or less. In general, leafy spurge control was similar at all sites and did not seem to be influenced by soil types, pH, organic matter or annual precipitation. After four treatments only picloram at 0.5 lb/A, with or without 2,4-D, has approached the target of 90 to 100% leafy spurge control. (Cooperative investigation Dept. of Agron. and ARS, U.S. Dept. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo).

Table. Leafy spurge control from annual picloram or picloram plus 2,4-D treatments and biannual 2,4-D treatments at three locations in North Dakota. (Lym and Messersmith).

		Site and 1984 evaluation date								
		Sheldon		Dickinson		Valley City		Mean in August		
Herbicide	Rate	June	Aug	June	Aug	June	Aug	1983	1983	1984[a]
	(lb/A)	(% control)								
Picloram	0.25	28	52	38	43	14	60	39	48	48
Picloram	0.375	54	52	61	51	46	65	65	62	52
Picloram	0.5	64	89	71	72	43	64	65	71	81
2,4-D bian	1.0	31	27	16	48	8	29	22	30	38
2,4-D bian	1.5	39	37	8	14	33	33	22	24	26
2,4-D bian	2.0	53	43	9	16	33	31	19	30	26
Pic+2,4-D	0.25+1.0	54	60	64	65	6	64	52	66	63
Pic+2,4-D	0.25+1.5	65	83	54	56	23	59	58	66	70
Pic+2,4-D	0.25+2.0	59	73	55	58	26	64	57	62	66
Pic+2,4-D	0.375+1.0	68	72	61	68	45	68	69	72	70
Pic+2,4-D	0.375+1.5	63	80	71	72	53	61	68	74	76
Pic+2,4-D	0.375+2.0	73	76	62	76	36	58	68	59	76
Pic+2,4-D	0.5+1.0	73	80	74	88	47	58	71	75	84
Pic+2,4-D	0.5+1.5	70	76	74	83	70	59	64	73	80
Pic+2,4-D	0.5+2.0	61	68	67	93	53	69	76	75	81
LSD (0.05)		20	20	22	29	29	16	18	14	19

[a] Experiment at Valley City began in June 1982 and is not included in August 1984 mean.

<u>Leafy spurge control in wooded areas with various herbicides</u>. Lym, R. G. and C. G. Messersmith. Leafy spurge is a major problem in wooded areas, shelterbelts, and around homes. The purpose of these experiments was to evaluate the controlled droplet applicator (CDA) and compressed air (Hudson single nozzle hand pumped model) sprayer for application of picloram, dicamba and glyphosate to leafy spurge growing under trees. Also, dichlobenil 10%G was applied at one site as a preemergence treatment for leafy spurge control.

The experiments were established at Mandan, ND in a tree grove, at Walcott, ND in a wind break, and in a wooded area of the Sheyenne National Grasslands near McLeod, ND. The trees were *Populus* spp. (cottonwood and aspen) and ranged from 6 to 16 inches in diameter with some saplings intermixed. The demonstration at Mandan was established on 26 August 1981 under a partly cloudy sky, 70 F and 96% relative humidity. The plot size was 25 by 50 ft and unreplicated. The demonstration at Walcott was established on 17 September 1981 under a partly cloudy sky, 70 F and 35% relative humidity, except the dichlobenil treatments were applied on 24 November 1981 under a cloudy sky, 32 F and 87% relative humidity. The plots were 20 by 50 ft and unreplicated. All glyphosate treated plots received two 2,4-D dimethylamine retreatments in the summer of 1982 using the CDA with a solution concentration of 0.8 lb/gal. The experiment at the Sheyenne National Grasslands was established on 21 September 1982 under a clear sky, 69 F, and 42% relative humidity and the soil was moist. The plots were 25 by 50 ft and replicated four times in a randomized complete block design. The treatments using the CDA and compressed air sprayers were applied with single coverage at walking speed, except some overlap occurred as the applicator tried to prevent skipped areas while walking around trees. The solution concentration was adjusted to apply approximately the same herbicide rate per acre with each applicator and was higher for CDA than compressed air application, since the CDA uses much less volume per treated area.

Leafy spurge control with glyphosate ranged from 80 to 99% at Mandan two years after application using either applicator (Table 1). However, control had declined to 15 to 70% at Walcott by August 1983. The Walcott site had some standing water until late July 1983 due to high precipitation in the area, which may have enhanced leafy spurge reestablishment. Picloram at 0.25 and 0.5 lb/gal at Mandan and at 0.25 lb/gal at Walcott gave 80% leafy spurge control two years after application. Saplings which showed herbicide injury in 1982 at Mandan had recovered by 1983. Picloram at 0.5 lb/gal applied at Walcott gave 95% leafy spurge control and was the only satisfactory treatment applied with the compressed air sprayer after 24 months. Picloram plus 2,4-D applied with the CDA at 0.17 + 0.33 lb/gal gave 84 and 70% leafy spurge control in 1983 and 1984, respectively, but ranged from 0 to 30% control when applied with the compressed air sprayer at 0.03 + 0.12 to 0.03 + 0.24 lb/gal. Dichlobenil did not provide satisfactory leafy spurge control.

Leafy spurge control at Mandan and Walcott generally was better than at the Sheyenne National Grasslands. All treatments at the Grasslands provided 92% or better leafy spurge control when evaluated in June 1983 but control declined rapidly thereafter (Table 2). The addition of 2,4-D to picloram did not improve leafy spurge control compared to picloram applied alone. No tree injury resulted from any treatment in these experiments. (Cooperative

investigation Dep. of Agron. and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.)

Table 1. Leafy spurge control by various herbicides applied with the controlled droplet and compressed air applicators under trees - Walcott and Mandan, ND.

Application	Herbicide	Herbicide concentration	Control							
			Mandan				Walcott			
			6-82	9-82	6-83	9-83	6-82	9-82	8-83	10-84
		(lb/gal)	(%)							
CDA	Glyphosate	1.5	100	90	83	80	95	78	70	45
	Glyphosate	0.75/1.0	95	100	95	90	85	50	20	0
	Picloram	0.5	100	85	80	80	98	65	30	10
	Picloram	0.25	90	70	82	80	92	90	80	50
	Dicamba	1.0	90	70	82	80	98	0	0	0
	Pic+2,4-D	0.17+0.33	90	70	82	80	99	100	84	70
Compressed air	Glyphosate	0.38	100	100	93	90	92	95	15	0
	Glyphosate	0.2	99	90	98	99	85	60	30	0
	Picloram	0.03	70	40	58	20	75	0	0	0
	Picloram	0.06	98	100	80	30	100	100	95	50
	Dicamba	0.12	98	100	80	30	97	95	60	20
	Pic+2,4-D	0.03+0.12	80	40	10	0	90	90	15	0
	Pic+2,4-D	0.03+0.24	80	20	30	30	90	90	15	0
Granular	Dichlobenil	4 lb/A	80	20	30	30	20	0	0	0
	Dichlobenil	8 lb/A	80	20	30	30	60	30	0	0

[a] Damage to saplings.

Table 2. Leafy spurge control by various herbicides applied using the CDA at a wooded site in the Sheyenne National Grasslands near McLeod, ND.

Herbicide	Herbicide concentration	Control			
		1983		1984	
		June	August	June	August
	(lb/gal)	(%)			
Picloram	0.25	92	60	49	48
Picloram	0.5	97	69	56	35
Picloram	0.67	100	77	57	49
Picloram + 2,4-D	0.2+0.4	92	48	28	42
Dicamba	1.33	92	75	60	30
Glyphosate	1.5	93	76	72	43
LSD (0.05)		9	35	38	16

<u>Leafy spurge control with resulting forage production from several herbicide treatments</u>. Lym, R. G. and C. G. Messersmith. An experiment to evaluate long term leafy spurge control and forage production was established at two sites in North Dakota in 1983. The predominate grasses were bluegrass (*Poa*. spp.) with occasional crested wheatgrass, smooth brome, big bluestem or other native grasses. The treatments were selected based on previous research conducted at North Dakota State University and included 2,4-D at 2.0 lb/A, picloram plus 2,4-D at 0.25 plus 1.0 lb/A, picloram at 2.0 lb/A and dicamba at 8.0 lb/A and were applied in August 1983 or June 1984 as spring or fall treatments. The 2,4-D at 2.0 lb/A and picloram plus 2,4-D treatments will be applied annually while the picloram alone and dicamba treatments will be reapplied when leafy spurge control declines to 70% or less. The plots were 15 by 50 ft with four replications in a randomized complete block design at each site. Forage yields were obtained by harvesting a 4 by 25 ft section with a rotary mower in July 1984. Sub-samples were taken by hand along each harvested strip and separated into leafy spurge and forage so the weight of each component in the mowed sample could be calculated. The samples were oven dried and are reported with 12% moisture content. Economic return was estimated by converting forage production to animal unit days (AUD) and then to pounds of beef at $0.60/lb minus the cost of the herbicide and estimated application cost, i.e. 2,4-D = $2.00/lb ai, dicamba = $11.75/lb ai, picloram = $40.00/lb ai, and application = $2.05/A.

			Valley City						Dickinson					
			Control		Yield				Control		Yield			
Treatment	Rate	Cost	June	Aug	Forage	Leafy spurge	Utilization	Net return	June	Sept	Forage	Leafy spurge	Utilization	Net return
	(lb/A)	($/A)	--(%)--		---(lb/A)---		(AUD)	($/A)	---(%)---		---(lb/A)---		(AUD)	$/A
Applied August 1983														
2,4-D	2.0	6.05	0	6	631	1282	16	3.55	5	32	434	189	11	0.55
Picloram	0.25+1.0	14.05	40	2	955	1184	23	- 0.25	20	14	343	236	9	- 8.65
Picloram	2.0	82.05	99	83	1928	0	48	-53.25	96	56	414	0	10	-76.05
Dicamba	8.0	96.05	82	21	1406	605	35	-75.05	95	15	293	28	7	-91.85
Applied June 1984														
2,4-D	2.0	6.05	...	0	820	1228	21	6.55	...	8	246	57	6	- 2.45
Picloram	0.25+1.0	14.05	...	28	1103	1015	28	2.75	...	51	385	11	10	- 8.05
Picloram	2.0	82.05	...	99	938	1228	24	-67.65	...	100	270	36	7	-77.85
Dicamba	8.0	96.05	...	91	832	1080	21	-83.45	...	67	226	24	6	-92.05
Control	...	0	...	0	745	1666	0[a]		...	0	253	321	0[a]	
LSD (0.05)			16	17	477	443			12	29	218	93		

[a] Estimated zero utilization by cattle in heavily infested areas of leafy spurge, based on data from study in progress.

Picloram at 2.0 lb/A and dicamba at 8.0 lb/A provided the highest average leafy spurge control at 98 and 89%, respectively, as fall applications and 99 and 79%, respectively, as spring applications. Picloram + 2,4-D at 0.25 + 1.0 lb/A provided low initial leafy spurge control, but previous research at North Dakota State University has shown that annual application of this treatment for 3 to 5 years will give 70 to 80% leafy spurge control and maximum forage production. 2,4-D controlled leafy spurge topgrowth only for 2 to 3 months.

Leafy spurge control with picloram using several pipe-wick applicator designs. Lym, R. G. and C. G. Messersmith. Leafy spurge control with picloram was evaluated using three designs of a pipe-wick applicator. The pipe-wick consisted of 0.75-inch PVC pipe with 0.12-inch holes drilled every 2 inches and covered by 0.5-inch poly-foam overlayed with canvas. The wicking material was wrapped around 75% of the pipe circumference and attached to the PVC pipe with contact cement. Liquid in the storage tank flowed into the wick with flow rate dependent on weed density. The design consisted of 1) two 6-ft bars, 1 ft apart, rectangular shaped (2-bar applicator); 2) three 6-ft bars 1 ft apart, rectangular shaped (3-bar applicator); and 3) two 6-ft bars 1 ft apart with three interconnecting diagonal bars so each leafy spurge stem was treated by the front, diagonal and rear bar (diagonal applicator). The picloram concentration in the wick was 0.5 lb/gal. Herbicide was applied using the wicks either with one pass or two passes; the second pass was in the opposite direction to the first pass. The experiment was established on 10 August 1981 in a pasture near Sheldon, ND when the leafy spurge was 16 to 32 inches tall and most seed was mature. The weather was 82 F, 70% relative humidity and the soil was dry and 89 F at 1 inch. The plots were 10 by 30 ft in a randomized complete block design. Evaluations were based on percent stand reduction as compared to the control.

Application	No. passes	Picloram concentration	1982		1983		1984	
			June	August	June	August	June	August
		(lb/gal)	(% control)					
2-Bar	1	0.5	77	36	48	17	14	11
2-Bar	2	0.5	88	77	76	55	36	35
3-Bar	1	0.5	75	15	30	11	8	6
3-Bar	2	0.5	92	80	86	57	46	36
Diagonal	1	0.5	71	56	52	45	14	13
Diagonal	2	0.5	100	99	97	84	73	72
LSD (0.05)			21	25	25	30	33	27

Picloram applied using two passes resulted in better leafy spurge control than a single pass regardless of applicator type. Picloram application with the diagonal wick resulted in better leafy spurge control than with either the 2-bar or 3-bar rectangular design, while the 2-bar and 3-bar designs provided similar leafy spurge control. Picloram applied with two passes of the diagonal wick provided 99, 84 and 72% leafy spurge control after 1, 2 and 3 years, respectively, which is similar to picloram broadcast at 2.0 lb/A despite using less chemical. Wick application of picloram is an inexpensive alternative to obtain leafy spurge control comparable to picloram at 2 lb/A spray applied even when two passes with the wick are required to maintain long term control. (Cooperative investigation Dep. of Agronomy and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.)

Total production at Dickinson averaged 574 lb/A compared to 2411 lb/A at Valley City. The difference was probably due to below normal annual precipitation at Dickinson while precipitation was near normal at Valley City. Fall applied 2,4-D at 2.0 lb/A was the only treatment to provide a positive economic return at Dickinson, despite good leafy spurge control by all other treatments. Fall applied picloram at 2.0 and dicamba at 8.0 lb/A resulted in 1928 and 1406 lb/A forage production, respectively, at Valley City but were uneconomical treatments after one year because of the high initial cost. Much leafy spurge topgrowth remained and forage production was unaffected by spring applied treatments at Valley City. 2,4-D at 2.0 lb/A resulted in positive economic return at Valley City despite only a slight reduction in leafy spurge growth. 2,4-D will control leafy spurge topgrowth long enough to allow cattle to graze the treated area but does not reduce the infestation. Herbicides that provided good leafy spurge control generally were not cost effective and less expensive annual treatments gave low leafy spurge control the first year of the study. (Cooperative investigation Dep. of Agronomy and ARS, U.S. Dep. of Agric. Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo 58105.)

<u>Forage utilization by cattle in leafy spurge infested pastureland.</u> Lym, Rodney G. and Donald R. Kirby. An experiment to evaluate forage utilization by cattle in various densities of leafy spurge was established on 1 May 1984 near Leonard, ND. The 300 A pasture carried 80 cow-calf pairs from May until mid-October. Caged plots were established in four leafy spurge densities, 80% or above (high), 40-80% (moderate), 20-40% (low) and no infestation (zero). Four caged and uncaged 0.25 m^2 paired plots were established per density and there were three replications. Picloram at 1.0 lb/A was applied on 15 June to establish the zero density areas. Production was harvested on 25-26 July and 18 October for caged and uncaged plots, respectively, and separated into cool- or warm-season grasses, leafy spurge and forbs. Caged plots estimated production while the difference between caged and uncaged plots estimated utilization. Natural disappearance of forage was estimated from similar experiments to be 30%.

Leafy spurge density	Leafy spurge	Yield							Disappearance	
		Leafy spurge	Caged			Uncaged				
			Cool	Warm	Total	Cool	Warm	Total	Total	Utilization[a]
(% cover)	(stems/ft)	(lb/A)							(%)	
0 (zero)	0	31	1259	159	1418	484	74	558	61	31
20-40 (low)	5	89	1517	265	1782	522	119	641	64	34
40-80 (moderate)	11	464	1061	486	1547	442	304	746	51	21
80-100 (high)	22	1362	925	245	1170	600	217	817	30	0
LSD (0.05)	3	221	396	209	440	396	209	440	4	

[a] Estimate of utilization by cattle based on: Total disappearance - natural disappearance (30%).

Forage production was similar in all densities of leafy spurge except the highest. Unlike many pasture and rangeland weeds, leafy spurge only slightly reduces forage production. However, all forage produced is lost if cattle refuse to graze an infested area. Cattle utilized 31 and 34% of the total forage produced in the zero and low density leafy spurge plots, respectively. Utilization declined to 21% when leafy spurge reached a moderate density of 11 stems/ft^2, and to zero utilization in the high density plots of 22 stem/ft^2. It was expected cattle would not graze in the moderate density plots but there are several possible reasons this area was grazed. Cattle may naturally graze in moderate leafy spurge stands, but past observations indicate this is unlikely. Mid-May to October was very dry and the stocking rate (animals/area for a given time) was very high so that the cattle may have been forced to graze in denser leafy spurge stands than normal. Also, cattle were observed grazing in leafy spurge stands after the plants were killed by frost but prior to the final harvest. Thus, utilization would have been overestimated. During the second year of the study uncaged plot areas will be harvested monthly so utilization can be estimated throughout the growing season.

Conventional versus no-till production of seven crops, Fargo 1984. Trials were established in silty clay soil (experiment initiated 1977) to compare conventional (fall plowing, spring cultivation, and harrowing) or no-till (seeding directly into standing stubble) production systems. Small grains and flax were seeded with a modified press drill and row crops with a flex planter. The experiment was a randomized complete block with a split plot arrangement and 4 replications. Experimental units were 15 by 40 ft.

			Conventional		No-till	
Crop	Variety	Seeding Date	Stand plants/3 ft	Yield units/A	Stand plants/3 ft	Yield unit/A
Wheat	Era	5/9	23	31.8 bu	19	32.4 bu
Barley	Park	5/9	21	39.3 bu	21	27.7 bu
Flax	Clark	5/9	53	4.5 bu	49	3.3 bu
Corn	Pioneer 3994	5/18	6	63 bu	5	70 bu
Sunflowers	SeedTec 315	5/18	6	1375 lb	6	1258 lb
Soybeans	McCall	5/18	18	7.6 bu	18	5.8 bu
Sugarbeet	Bush	5/18	7	8.7 T	7	5.2 T

Summary

Wheat, flax, and sunflower yields were similar under no-till and conventional-till systems. Corn yields were higher whereas barley, soybean, and sugarbeet yields were lower under no-till compared to conventional-till systems in 1984.

Conventional versus no-till productions of wheat, Fargo 1984. Trials were established in silty clay soil (experiment initiated 1976) to compare conventional and no-till production of seven crops in 1982. Era wheat was seeded on this same plot area May 10, 1984. The experiment was a randomized complete block withl a split plot arrangement and four replications. Experimental units were 15 by 40 ft.

1982	Wheat		Weeds/3 sq ft			
Crop	spikes/3 ft	Yield bu/A	Grft	KOCZ	Rrpw	Cath
	---conventional---					
Wheat	85	31.5	9	2	0	0
Barley	83	26.2	11	3	0	1
Flax	109	35.2	1	7	0	0
Corn	88	34.9	1	3	5	0
Soybean	102	44.9	1	2	2	0
Sunflower	105	42.6	0	3	1	0
Sugarbeet	110	45.4	1	2	1	0
Mean	97	37.2	3	3	1	0
	---no-till---					
Wheat	46	16.3	6	41	0	1
Barley	37	18.0	5	65	1	2
Flax	39	36.9	3	35	0	2
Corn	106	38.5	4	4	1	1
Soybean	118	44.9	4	7	2	1
Sunflower	104	44.2	1	9	0	0
Sugarbeet	106	47.4	1	5	3	1
Mean	81	35.2	3	24	1	1
LSD (0.05) Till	11	NS	NS	6	NS	0.5
Crop	20	11	4	12	NS	NS
Crop x Till	28	NS	NS	17	NS	NS

Summary

Wheat stand counts were lowest under no-till with wheat, barley, and flax as previous crop. Wheat yields ranged from 16 to 45 bu/A. Wheat yields were low under no-till with wheat and barley and previous crop due to the presence of kochia. The highest wheat yields were obtained when wheat followed soybean, sunflower, or sugarbeet, regardless of tillage system.

Fall and spring applied herbicides for weed control in fallow, Fargo 1983-1984. Treatments were applied in standing wheat stubble (500lb/A) on a silty clay soil, pH 7.5 and 6% organic matter. Fall treatments (F) were applied on November 7, 1983 and spring treatments (S) were applied on May 29, 1984 to determine their effectiveness for weed control in fallow during 1984. All treatments were applied with a bicycle wheel plot sprayer delivering 17 gpa at 35 psi. The experimental design was a randomized complete block with three replications and experimental units were 10 by 30 ft. Precipitation for a two week period following spring applicatons was 4.53 inches. Weed densities were light to heavy. Weed control was evaluated on July 20.

Treatment	Rate lb/A	--Percent Wimu	control-- KOCZ
Cyan-W+Atra-W (F)	2.5+.5	89	86
Cyan-W+R40244 (F)	2.5+.5	95	87
Cyan-W+Metr-W (F)	2.5+.5	88	70
Met-W(F)+Par+Met-W+S(S)	.5+.5+.37+.5%	80	75
Chlorsulfuron (F)	.015	79	94
Chlorsulfuron (F)	.03	98	99
Metsulfuron (F)	.0075	74	99
Metsulfuron (F)	0.015	89	99
Metsulfuron (F)	.0225	99	99
Clsu (F) +Glyp+Surf (S)	.015+.25+.5%	85	99
Mets (F) +Glyp+Surf(S)	.015+.25+.5%	96	99
Hexa+Clsu (F)	.5+.015	95	99
Hexa+Fluorochloridone(F)	.5+.5	95	71
Fluo (F) +Sulfosate (S)	.5+.25	87	78
Buth+Metr-W (F)	.5+.5	77	62
Metr-W+R40244 (F)	.5+.5	93	87
Para+Cyan-W+Surf (S)	.5+2+.5%	99	92
Para+Metr-W+Surf (S)	.5+.5+.5%	89	78
Para+Clsu+Surf (S)	.5+.015+.5%	91	86
Para+Fluorochloridone+Surf(S)	.5+.5+.5%	99	93
Glyp+Clsu+Surf (S)	.25+.015+.5%	94	88
Glyp+Mets+Surf (S)	.25+.015+.5%	99	98
Glyp+Fluo+Surf (S)	.25+.5+.5%	94	92
Sulf+Clsu+Surf (S)	.25+.015+.5%	91	85
Sulf+R40244 (S)	.25+.5	94	93
Pend(F) +Gly+Dica+S(S)	1.5+.25+.25+.5%	37	58
Glyp+Pend+Dica+S (S)	.25+1.5+.25+.5%	57	77
Control	0	0	0
Mean		84	84
High mean		99	99
Low mean		0	0
Coeff. of variation		10	10
LSD(1 Percent)		18	19
LSD(5 Percent)		14	14
No. of reps		3	3

Summary

All treatments except glyphosate + pendimethalin + dicamba gave good to excellent wild mustard control. Treatments containing chlorsulfuron, metsulfuron, or flurochloridone gave excellent kochia control.

Fall and spring applied herbicides for weed control in fallow,Minot 1983-1984. Treatments were applied on standing wheat stubble (2000 lb/A) on a sandy loam soil, pH 7.1 and 2.7% organic matter. Fall treatments (F) were applied on October 26, 1983 and spring treatments (S) were applied on June 5, 1984 to determine their effectiveness for weed control in fallow during 1984. All treatments were applied with a bicycle wheel plot sprayer delivering 17 gpa at 35 psi. The experimental design was a randomized complete block with four replications and experimental units were 10 by 30 ft. Precipitation for a 2 week period following spring application was 1.38 inches. Weed densities were light to heavy. Weed control was evaluated on July 12.

Treatment	Rate lb/A	---- Percent control ---- Grft	Ruth	Wibu
Cyan-W+Atra-W (F)	2.5+.5	43	46	45
Cyan-W+R40244 (F)	2.5+.5	41	45	77
Cyan-W+Metr-W (F)	2.5+.5	56	53	13
Met-W(F)+Par+Met-W+S(S)	.5+.5+.37+.5%	96	93	86
Chlorsulfuron (F)	.015	36	58	69
Chlorsulfuron (F)	.03	32	80	86
Metsulfuron (F)	.0075	52	45	50
Metsulfuron (F)	.015	33	58	50
Metsulfuron (F)	.0225	41	50	72
Clsu (F) +Glyp+Surf (S)	.015+.25+.5%	38	84	85
Mets (F) +Glyp+Surf(S)	.015+.25+.5%	38	43	75
Hexa+Clsu (F)	.5+.015	25	80	84
Hexa+Fluorochloridone (F)	.5+.5	47	23	75
Fluo (F) +Sulfosate (S)	.5+.25	80	76	72
Buth+Metr-W (F)	.5+.5	46	33	60
Metr-W+R40244 (F)	.5+.5	29	48	42
Para+Cyan-W+Surf (S)	.5+2+.5%	96	93	92
Para+Metr-W+Surf (S)	.5+.5+.5%	97	95	93
Para+Clsu+Surf (S)	.5+.015+.5%	90	93	81
Para+Fluorochloridone+Surf(S)	.5+.5+.5%	73	72	50
Glyp+Clsu+Surf (S)	.25+.015+.5%	39	70	80
Glyp+Mets+Surf (S)	.25+.015+.5%	89	94	93
Glyp+Fluo+Surf (S)	.25+.5+.5%	82	60	63
Sulf+Clsu+Surf (S)	.25+.015+.5%	90	95	90
Sulf+Fluorochloridone (S)	.25+.5	58	55	64
Pend(F) +Gly+Dica+S(S)	1.5+.25+.25+.5%	82	48	65
Glyp+Pend+Dica+S (S)	.25+1.5+.25+.5%	93	60	56
Control	0	0	0	0
Mean		58	62	67
High mean		97	95	93
Low mean		0	0	0
Coeff. of variation		31	21	19
LSD(1 Percent)		34	24	28
LSD(5 Percent)		25	18	21
No. of reps		4	4	3

Summary

Green foxtail control of 90% or greater was obtained with paraquat plus either cyanazine, metribuzin or chlorsulfuron, sulfosate + chlorsulfuron, and glyphosate + pendimethalin + dicamba. Treatments containing chlorsulfuron and metsulfuron tended to provide the best control of Russian thistle and wild buckwheat. Weed control was generally better with spring treatments compared to fall treatments.

Fall and spring applied herbicides for weed control in fallow, Williston 1983-1984. Treatments were applied in standing wheat stubble (1500 lb/A) on a clay loam soil, pH 6.8 and 2.1% organic matter. Fall treatments (F) were applied on October 25, 1983 and spring treatments (S) were applied on May 16 to determine their effectiveness for weed control in fallow during 1984. All treatments were applied with a bicycle wheel plot sprayer delivering 17 gpa at 35 psi. The experimental design was a randomized complete block with four replications and experimental units were 10 by 30 ft. Precipitation for a 2 week period following spring application was 0.46 inch. Weed densities were light to heavy. Weed control was evaluated on July 12.

Treatment	Rate lb/A	--- Percent control --- Flix	Ruth	Grft
Cyan-W+Atra-W (F)	2.5+.5	71	46	59
Cyan-W+R40244 (F)	2.5+.5	99	74	55
Cyan-W+Metr-W (F)	2.5+.5	96	62	46
Met-W(F)+Par+Met-W+S(S)	.5+.5+.37+.5%	98	90	95
Chlorsulfuron (F)	.015	92	88	64
Chlorsulfuron (F)	.03	86	82	59
Metsulfuron (F)	.0075	74	71	65
Metsulfuron (F)	.015	45	71	55
Metsulfuron (F)	.0225	98	87	56
Clsu (F) +Glyp+Surf (S)	.015+.25+.5%	84	86	59
Mets (F) +Glyp+Surf(S)	.015+.25+.5%	82	82	66
Hexa+Clsu (F)	.5+.015	96	94	94
Hexa+Fluorochloridone (F)	.5+.5	99	87	97
Fluo (F) +Sulfosate (S)	.5+.25	99	39	52
Buth+Metr-W (F)	.5+.5	99	77	87
Metr-W+R40244 (F)	.5+.5	98	80	58
Para+Cyan-W+Surf (S)	.5+2+.5%	24	44	54
Para+Metr-W+Surf (S)	.5+.5+.5%	75	81	87
Para+Clsu+Surf (S)	.5+.015+.5%	50	72	80
Para+Fluorochloridone+Surf(S)	.5+.5+.5%	40	55	51
Glyp+Clsu+Surf (S)	.25+.015+.5%	96	91	95
Glyp+Mets+Surf (S)	.25+.015+.5%	98	90	82
Glyp+Fluo+Surf(S)	.25+.5+.5%	50	58	65
Sulf+Clsu+Surf (S)	.25+.015+.5%	97	89	94
Sulf+Fluorochloridone (S)	.25+.5	41	55	51
Pend(F) +Gly+Dica+S(S)	1.5+.25+.25+.5%	95	58	90
Glyp+Pend+Dica+S (S)	.25+1.5+.25+.5%	26	66	88
Control	0	0	0	0
Mean		75	70	68
High mean		99	94	97
Low mean		0	0	0
Coeff. of variation		20	19	21
LSD(1 Percent)		28	24	27
LSD(5 Percent)		21	18	20
No. of reps		4	4	4

Summary

Green foxtail control of 90% or greater was obtained with treatments containing pendimethalin and with spring treatments of chlorsulfuron in combination with hexazinone, glyphosate, or sulfosate. Treatments containing chlorsulfuron, metsulfuron or metribuzin gave excellent flixweed control. Chlorsulfuron and metsulfuron also gave good kochia control.

Spring applied herbicides for weed control in fallow, Fargo 1984. Treatments were applied in standing wheat stubble on a silty clay soil,pH 7.5 and 6% organic matter on May 29 to determine their effectiveness for weed control in fallow during 1984. All treatments were applied with a bicycle wheel plot sprayer delivering 17 gpa at 35 psi. The experiment was a randomized complete block design with four replications and experimental units were 10 by 30 ft. Precipitation for a 2 week period following application was 4.53 inches. Weed control was evaluated on June 29.

Treatment	Rate oz/A	----- Percent Wibu	Wioa	control Wimu	----- Koch
Paraquat+Surf	8+.5%	23	26	75	65
Paraquat+Fluorochloridone+Surf	8+8+.5%	74	21	98	93
Paraquat+Terbutryn+Surf	4+24+.5%	53	44	91	74
Glyphosate+Surf	4+.5%	54	76	59	50
Glyp+Fluorochloridone+Surf	4+8+.5%	51	78	94	85
Glyp+Fluo+Dicamba+Surf	4+8+2+.5%	90	55	94	86
Glyp+Fluo+Metribuzin-F+Surf	4+8+8+.5%	98	58	98	99
Glyp+Terbutryn+Surf	4+24+.5%	65	41	81	65
Sulfosate	4	65	73	53	48
Sulf+Fluorochloridone	4+8	63	64	93	78
Sulf+Fluo+Dicamba	4+8+2	83	66	93	89
Sulf+Fluo+Metribuzin-F	4+8+8	85	36	99	95
Sulf+Terbutryn	4+24	78	36	88	74
Terbutryn+Surf	24+.5%	70	36	70	74
Terbutryn+Fluorochloridone+Su	24+8+.5%	96	44	95	94
Terbutryn+Metribuzin-F+Surf	24+8+.5%	98	41	100	95
Untreated check	0	0	0	0	0
Mean		67	47	81	74
High mean		98	78	100	99
Low mean		0	0	0	0
Coeff. of variation		26	30	10	18
LSD(1 Percent)		33	27	15	25
LSD(5 Percent)		25	20	11	18
No. of reps		4	4	4	4

Summary

None of the treatments gave acceptable control of wild oat. Either glyphosate or sulfosate applied with fluorochloridone + dicamba or fluorochloridone + metribuzin gave good control of broadleaf weeds. Terbutryn +fluorochloridone and terbutryn + metribuzin gave 94% or greater control of wild buckwheat, wild mustard, and kochia.

Spring applied herbicides for weed control in fallow, Minot 1984. Treatments were applied in standing wheat stubble on a sandy loam soil,pH 7.1 and 2.7% organic matter on June 5 to determine their effectiveness for weed control in fallow during 1984. All treatments were applied with a bicycle wheel plot sprayer delivering 17 gpa at 35 psi. The experiment was a randomized conplete block design with four replications and experimental units were 10 by 30 ft. Precipitation for a 2 week period following application was 1.38 inches. Weed control was evaluated on July 12.

Treatment	Rate oz/A	----- Percent Grft	Ruth	control Wioa	----- Wibw
Paraquat+Surf	8+.5%	31	65	70	63
Paraquat+Fluorochloridone+Surf	8+8+.5%	60	70	66	54
Paraquat+Terbutryn+Surf	4+24+.5%	67	93	69	92
Glyphosate+Surf	4+.5%	28	30	80	76
Glyp+Fluorochloridone+Surf	4+8+.5%	80	93	95	92
Glyp+Fluo+Dicamba+Surf	4+8+2+.5%	68	92	73	97
Glyp+Fluo+Metribuzin-F+Surf	4+8+8+.5%	96	95	96	98
Glyp+Terbutryn+Surf	4+24+.5%	53	92	79	84
Sulfosate	4	17	31	60	76
Sulf+Fluorochloridone	4+8	59	68	89	76
Sulf+Fluo+Dicamba	4+8+2	50	78	70	90
Sulf+Fluo+Metribuzin-F	4+8+8	95	97	98	97
Sulf+Terbutryn	4+24	43	86	88	60
Terbutryn+Surf	24+.5%	16	74	34	53
Terbutryn+Fluorochloridone+Su	24+8+.5%	91	94	83	94
Terbutryn+Metribuzin-F+Surf	24+8+.5%	92	95	97	96
Untreated check	0	0	0	0	0
Mean		56	74	73	76
High mean		96	97	98	98
Low mean		0	0	0	0
Coeff. of variation		27	17	26	20
LSD(1 Percent)		28	24	36	28
LSD(5 Percent)		21	18	27	21
No. of reps		4	4	4	4

Summary

Treatments containing metribuzin and/or fluorochloridone provided excellent Russian thistle and wild buckwheat control. Fluorochloridone + metribuzin applied with either glyphosate or sulfosate or terbutryn + metribuzin gave over 90% green foxtail and wild oat control.

Spring applied herbicides for weed control in fallow, Williston 1984. Treatments were applied in standing wheat stubble on a clay loam soil, pH 6.8 and 2.1% organic matter on May 16 to determine their effectiveness for weed control in fallow during 1984. All treatments were applied with a bicycle wheel plot sprayer delivering 17 gpa at 35 psi. The experiment was a randomized complete block design with four replications and experimental units were 10 by 30 ft. Precipitation for a 2 week period following application was 0.46 of an inch. Weed control was evaluated on July 12.

Treatment	Rate oz/A	- Percent control - Flix	Grft
Paraquat+Surf	8+.5%	55	16
Paraquat+Fluorochloridone+Surf	8+8+.5%	27	69
Paraquat+Terbutryn+Surf	4+24+.5%	59	19
Glyphosate+Surf	4+.5%	40	30
Glyp+Fluorochloridone+Surf	4+8+.5%	60	61
Glyp+Fluo+Dicamba+Surf	4+8+2+.5%	51	56
Glyp+Fluo+Metribuzin-F+Surf	4+8+8+.5%	53	97
Glyp+Terbutryn+Surf	4+24+.5%	67	33
Sulfosate	4	17	8
Sulf+Fluorochloridone	4+8	45	53
Sulf+Fluo+Dicamba	4+8+2	42	66
Sulf+Fluo+Metribuzin-F	4+8+8	47	93
Sulf+Terbutryn	4+24	34	39
Terbutryn+Surf	24+.5%	50	30
Terbutryn+Fluorochloridone+Surf	24+8+.5%	35	66
Terbutryn+Metribuzin-F+Surf	24+8+.5%	69	96
Untreated check	0	0	0
Mean		44	49
High mean		69	97
Low mean		0	0
Coeff. of variation		59	29
LSD(1 Percent)		58	26
LSD(5 Percent)		43	20
No. of reps		3	4

Summary

Flixweed control was poor with all treatments. Excellent green foxtail control was obtained with fluorochloridone + metribuzin with either glyphosate or sulfosate and with terbutryn + metribuzin.

Weed control in no-till soybeans,Fargo 1982. An experiment was conducted on a silty clay soil with pH 7.5 and 6% organic matter to evaluate various herbicide combinations for weed control in no-till soybeans. 'McCall' soybeans were seeded in rows 30 inches apart on May 22. Preemergence (PE) treatments were applied on May 28 to 1 to 3 leaf yellow foxtail, 1 to 5 inch wild mustard, and 0.5 to 2 inch kochia. The first postemergence applications (P1) were made on July 2 to 1 to 2 trifoliate soybeans 2 to 5 leaf yellow foxtail, 8 to 12 inch wild mustard, and 2 to 4 inch kochia. The second postemergence applicatons (P2) were made on July 9 to 4 trifoliate soybeans and 3 to 5 leaf yellow foxtail. Rainfall for two weeks following the preemergence applications was 4.53 inches, and no rainfall occurred within five days after the postemergence herbicide applications. All treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. The experiment was a randomized complete block with four replications and experimental units were 10 by 24 ft. Soybean injury and weed control were evaluated on July 17.

Treatment		Rate oz/A	Soybean %ir	--Percent Yeft	control-- Wimu	Kocz
Glyp+Meto+Metr+S	PE	4+40+8+.5%	1	94	74	65
Glyp+Alac+Metr+S	PE	4+40+8+.5%	4	87	84	75
G&2,4-D&S+Meto+Metr	PE	11+40+8	1	55	92	73
G&2,4-D&S+Alac+Metr	PE	11+40+8	0	83	95	86
G+Metr+S/F+PO	PE/P	4+8+.5%+2.5+.25G	0	94	76	29
G+S/F+B+A+PO	PE/P	4+.5%+2.5+12+4+.25G	29	80	86	88
G+S/B+A+PO/F+PO		4+.5%+12+4+1qt+2.5+.25G	18	79	88	83
S+2+P/B+A+P/S+P		1.5+8+1q+12+4+1q+3+1qt	15	77	98	93
G+Pend+Clam+Surf	PE	4+32+32+.5%	0	93	85	83
Untreated check		0	0	0	0	0
Mean			7	74	78	67
High mean			29	94	98	93
Low mean			0	0	0	0
Coeff. of variation			46	10	11	19
LSD(1 Percent)			6	14	17	26
LSD(5 Percent)			4	10	13	19
No. of reps			4	4	4	4

Summary

None of the herbicides caused any soybean stand reduction. The postemergence application of a tank mix of fenoxaprop plus bentazon plus acifluorfen plus PO caused substantial soybean injury. Yellow foxtail control with fenoxaprop was reduced from 94 to 80% when tank mixed with bentazon and acifluorfen. Treatments containing bentazon plus acifluorfen and the treatments of pendimethalin plus chloramben gave over 85% wild mustard and kochia control.

Weed control in notill sunfower, Fargo 1984. 'Seed Tec 315' sunflower was seeded May 22 in 30 inch rows. Preemergence (PE) treatments were applied May 31 with 59 F, 8 to 15 mph S wind, and dry soil surface to 1 to 3 leaf yellow foxtail, 4 to 8 inch wild mustard, and 1 to 3 inch kochia. Postemergence (P) treatments were applied July 2 with 65 F and 10 mph S wind to 6 to 8 leaf sunflower, 3 to 4 leaf yellow foxtail, 5 to 14 inch wild mustard,and 3 to 8 inch kochia. All treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with three replications and experimental units were 10 by 20 ft. Crop injury and weed control ratings were taken July 17. Weed densities were 20 yellow foxtail/ft2, 50 wild mustard/yd2, and 2 kochia/yd2.

Treatment	Rate oz/A	Snfl %ir	--Percent Yeft	control-- Wimu	Kocz
Paraquat+Surf PE	8+.5%	0	43	55	55
Para+Prodiamine+Surf PE	8+16+.5%	3	65	42	67
Para+Pendimethalin+Surf PE	8+32+.5%	0	73	57	73
Para+Pend+Fluo+Surf PE	8+32+8+.5%	2	83	89	92
Para+Pend+Fluo+Surf PE	8+32+12+.5%	3	82	99	97
Par+Pend+S/Ben+PO PE/P	8+32+.5%+6+.25G	17	82	88	97
Par+Pend+S/Ben+Acif PE/P	8+32+.5%+4+2	13	73	99	94
Para+Pend+Prom+Surf PE	8+32+32+.5%	8	88	93	90
Para+Fluo+S PE	8+8+.5%	0	50	85	93
Para+Fluo+S PE	8+12+.5%	8	72	98	93
Para+Flu+S/Seth+OC PE/P	8+8+.5%+4+.25G	3	97	99	80
Para+Flu+S/Seth+OCPE/P	8+12+.5%+4+.25G	0	98	98	91
Para+Prom+Surf PE	8+32+.5%	10	75	70	78
Para+Prom+Surf PE	8+64+.5%	8	86	91	96
Prometryn+PO P	64+.25G	2	68	82	88
Glyphosate+Surf PE	4+.5%	5	47	28	52
Glyp+Pend+Fluo+Surf PE	4+32+8+.5%	0	78	91	80
Glyp+Fluo+Surf PE	4+8+.5%	7	83	96	86
Glyp+Pend+Brox-2+Surf PE	4+32+2+.5%	0	83	62	65
Glyp&2,4-D&Surf PE	11	7	53	59	63
Glyp&2,4-D&Surf+Pend+Fluo PE	11+32+8	8	62	96	92
Glyp&2,4-D&Surf+Fluo PE	11+8	0	58	96	91
Untreated check	0	0	0	0	0
Mean		5	70	77	79
High mean		17	98	99	97
Low mean		0	0	0	0
Coeff. of variation		114	20	25	18
LSD(1 Percent)		11	30	42	31
LSD(5 Percent)		8	23	32	24
No. of reps		3	3	3	3

Summary

None of the treatments reduced sunflower stand. Treatments containing benazolin, acifluorfen, or prometryn caused slight sunflower injury. Treatments containing pendimethalin gave 73 to 88% yellow foxtail control. Sethoxydim gave up to 98% yellow foxtail control. Treatments containing fluorochloridone gave the highest and most consistent control of wild mustard and kochia. Treatments consisting of PE paraquat plus fluorochloridone followed by postemergence sethoxydim provided the best broad spectrum weed control when compared to the other treatments in the experiment.

Weed control in no-till sunflower, Minot 1984. 'Jakes 503' sunflower was seeded into wheat stubble May 30 in 30 inch rows. Preemergence (PE) herbicide treatments were applied immediately after sunflower seeding to 1 to 3 leaf volunteer wheat, 1 to 2 leaf green foxtail, and 0.5 to 2 inch common lambsquarter. Postemergence treatments (P) were applied June 19 to 6 to 8 leaf sunflower, 5 to 6 leaf volunteer wheat, 2 to 4 inch green foxtail, and 2 to 4 inch common lambsquarter. All treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. The experiment design was a randomized complete block with 3 replications. Weed densities were light to moderate and control ratings were taken July 13.

Treatment	Rate oz/A	---- Percent control ---- Colq	Grft	Vwht
Glyphosate+Surf PE	4+.5%	49	0	85
Glyp+Prodiamine+Surf PE	4+16+.5%	32	0	83
Glyp+Pendimethalin+Surf PE	4+32+.5%	76	87	87
Glyp+Pend+fluo+Surf PE	4+32+8+.5%	99	91	92
Glyp+Pend+fluo+Surf PE	4+32+12+.5%	99	93	81
Gl+Pe+S/Bena+PO PE/P	4+32+.5%+6+.25G	95	89	82
Gl+Pen+S/Bena+Acif PE/P	4+32+.5%+4+2	96	82	71
Glyp+Pend+Prom+Surf PE	4+32+32+.5%	99	91	89
Glyp+Fluo+Surf PE	4+8+.5%	95	61	69
Glyp+Fluo+Surf PE	4+12+.5%	99	75	67
Gl+Fluo+S/Seth+PO PE/P	4+8+.5%+4+.25G	93	95	92
Gl+Fluo+S/Seth+PO PE/P	4+12+.5%+4+.25G	98	91	65
Glyp+Alac+Fluo+Surf PE	4+48+12+.5%	99	91	63
Glyp+Pend+Clam+Surf PE	4+32+32+.5%	93	94	53
Glyp+Prom+Surf PE	4+32+.5%	99	54	56
Glyp+Prom+Surf PE	4+64+.5%	99	83	87
Prometryn+PO P	64+.25G	99	83	71
Untreated check	0	0	0	0
Mean		84	70	72
High mean		99	95	92
Low mean		0	0	0
Coeff. of variation		9	9	19
LSD(1 Percent)		17	14	29
LSD(5 Percent)		12	11	22
No. of reps		3	3	3

Summary

All of the treatments except glyphosate alone or glyphosate + prodiamine or pendimethalin gave excellent common lambsquarter control. Treatments containing pendimethalin at 32 oz/A, alachlor at 48 oz/A sethoxydim at 4 oz/A or premetryn at 64 oz/A gave good to excellent green foxtail and volunteer wheat control. No sunflower stand reduction or injury was observed in the experiment.

Weed control in notill sunflower, Sarles 1984. 'Dahlgren 135' confectionary sunflowers were seeded May 29 and preemergence (PE) treatments were applied on June 4 with 63 F, 100% relative humidity (light rain), and wet soil. Postemergence (P) treatments were appled June 27 with 70 F, 40% relative humidity, and 20 to 25 mph NW wind to 4 to 6 leaf sunflower, 3 to 4 leaf green foxtail, and 1 to 8 inch kochia, wild buckwheat, and redroot pigweed. Crop injury was determined in three replications and weed control was determined in two replications on July 25.

Treatment	Rate lb/A	--Snfl-- %sr	%ir	--Percent control-- Grft	Kocz	Wibu	Rrpw
Paraquat+Surf PE	8+.5%	0	0	53	35	30	15
Para+Prodiamine+Surf PE	8+16+.5%	3	0	50	35	55	40
Para+Pendimethalin+Surf PE	8+32+.5%	3	3	90	83	68	85
Para+Pend+Fluor+Surf PE	8+32+8+.5%	3	5	92	88	80	90
Para+Pend+Fluo+Surf PE	8+32+12+.5%	8	7	95	97	90	88
Par+Pen+S/Bena+OC PE/P	8+32+.5%+6+.25G	20	15	80	95	99	99
Par+Pen+S/Bena+Acif PE/P	8+32+.5%+4+2	17	22	90	96	99	99
Para+Pend+Prom+Surf PE	8+32+32+.5%	12	12	93	95	84	88
Para+Fluo+Surf PE	8+8+.5%	3	2	67	88	58	85
Para+Fluo+Surf PE	8+12+.5%	0	0	84	88	75	83
Par+Flu+S/Seth+OC PE/P	8+8+.5%+4+.25G	7	5	99	95	87	84
Par+Flu+S/Seth+OCPE/P	8+12+.5%+4+.25G	3	13	99	96	73	92
Para+Prom+Surf PE	8+32+.5%	8	5	90	95	88	93
Para+Prom+Surf PE	8+64+.5%	10	8	90	99	98	97
Prometryn+OC PE	64+.25G	17	17	94	95	97	97
Glyphosate+Surf PE	4+.5%	0	0	45	20	30	20
Glyp+Pend+Fluo+Surf PE	4+32+8+.5%	5	0	94	95	97	97
Glyp+Fluo+Surf PE	4+8+.5%	2	0	83	90	90	85
Glyp+Pend+Brox-2+Surf PE	4+32+2+.5%	10	7	92	97	80	90
Glyp&2,4-D&Surf PE	11	2	2	40	30	43	35
Glyp&2,4-D&Surf+Pend+Fluo PE	11+32+8	10	3	94	99	96	99
Glyp&2,4-D&Surf+Fluo PE	11+8	2	3	75	90	75	59
Untreated check	0	0	0	0	0	0	0
Mean		6	6	78	78	73	75
High mean		20	22	99	99	99	99
Low mean		0	0	0	0	0	0
Coeff. of variation		123	137	16	20	30	21
LSD(1 Percent)		17	17	35	44	63	45
LSD(5 Percent)		13	12	25	33	46	33
No. of reps		3	3	2	2	2	2

Summary

Treatments containing pendimethalin, prometryn,or sethoxydim generally gave excellent green foxtail control. Prometryn alone or fluorochloridone or benazolin plus pendimethalin or sethoxydim gave good to excellent control of broadleaf weeds.

False chamomile control in fallow, Mohall 1984. Treatments were applied June 20 with clear sky, 70F, and 15 mph NE wind to 1 to 4 inch spring emerged false chamomile. The experimental design was a randomized complete block with 4 replications. Control ratings were taken on July 25.

Treatment	Rate oz/A	%control Faca
Paraquat+X-77	8+0.5%	73
Paraquat+Clsu+X-77	8+0.25+0.5%	96
Paraquat+Metsulfuron+X-77	8+0.25+0.5%	98
Paraquat+DPX-M6316+X-77	8+0.25+0.5%	75
Paraquat+Terbutryn+X-77	8+24+0.5%	92
Paraquat+Fluo+X-77	8+12+0.5%	91
Glyphosate+X-77	4+0.5%	29
Glyphosate+Clsu+X-77	4+0.25+0.5%	85
Glyphosate+Metsulfuron+X-77	4+0.25+0.5%	93
Glyphosate+DPX-M6316+X-77	4+0.25+0.5%	54
Untreated check	0	0
Mean		71
High mean		98
Low mean		0
Coeff. of variation		18
LSD(1 Percent)		25
LSD(5 Percent)		19
No. of reps		4

Summary

All of the treatments except paraquat and glyphosate applied alone or with DPX-M6316 gave excellent false chamomile control.

False chamomile control in potholes, Mohall 1984. Treatments were applied June 20 with clear sky, 70F, and 15 mph NE wind to 1 to 4 inch spring emerged false chamomile and 6 to 20 inch fall emerged false chamomile. The experimental design was a randomized complete block with 4 replications. Control ratings were taken on July 25.

Treatment	Rate oz/A	%control Faca
Glyphosate+X-77	4+0.5%	34
Glyphosate+X-77	8+0.5%	67
Glyphosate+X-77	12+0.5%	84
Sulfosate	8	73
Sulfosate	12	79
Paraquat+X-77	8+0.5%	86
Amitrol	16	70
Amitrol	24	74
Fluorochloridone+X-77	12+0.5%	18
Untreated check	0	0
Mean		58
High mean		86
Low mean		0
Coeff. of variation		19
LSD(1 Percent)		22
LSD(5 Percent)		16
No. of reps		4

Summary

Glyphosate or sulfosate at 12 oz/A and paraquat at 8 oz/A gave good false chamomile control. None of the other treatments gave adequate false chamomile control.

Glyphosate plus additives, Fargo 1984. An experiment was conducted at Fargo, ND to compare the burndown activity of glyphosate when applied alone or with X-77 or frigate. Treatments were applied prior to soybean emergence on June 1 with 68 F, 50% relative humidity, clear sky, and 10 to 15 mph NE wind to 1 to 3 leaf yellow foxtail and 2 to 8 inch wild mustard. Treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with 3 replications and experimental units were 10 by 24 ft. Weed control ratings were taken July 17.

Treatment	Rate oz/A	Soybean %ir	--% control-- Yeft	Wimu
Glyphosate	2	0	23	32
Glyphosate	6	0	37	63
Glyphosate	8	0	53	80
Glyphosate+X-77	2+0.5%	0	50	48
Glyphosate+X-77	6+0.5%	0	47	82
Glyphosate+X-77	8+0.5%	0	57	77
Glyphosate+Frigate	2+0.5%	0	50	42
Glyphosate+Frigate	6+0.5%	0	45	79
Glyphosate+Frigate	8+0.5%	0	52	95
Untreated check	0	0	0	0
Mean		0	41	60
High mean		0	57	95
Low mean		0	0	0
Coeff. of variation		0	37	27
LSD(1 Percent)		0	36	37
LSD(5 Percent)		0	27	27
No. of reps		3	3	3

Summary

The addition of X-77 and frigate to glyphosate at 2 or 6 oz/A tended to increase weed control compared to glyphosate applied alone. Weed control was similar with glyphosate + X-77 or glyphosate + frigate. For example, yellow foxtail control was 51 and 49% and wild mustard control was 69 and 72% with glyphosate + X-77 and glyphosate + frigate, respectively, averaged over glyphosate rates.