1985 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NOT FOR PUBLICATION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 1985
WEED CONTROL EXPERIMENTS

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Computer disks of wild oats and general weed control research reports are available upon request.

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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				.14		49	25	72	33	58	39	82	56	79	56
2						58	36	78	49	60	35	80	50	78	60
3				T	T	48	28	84	55	62	40	90	61	81	67
4		T	T		T	41	24	89	47	62	43	79	59	79	63
5		T				40	23	71	40	69	40	86	55	83	60
6	T		T	T		46	23	72	38	77	58	94	60	81	60
7	T		T			42	24	72	34	87	57	98	59	85	55
8		.02	T	T		39	19	89	50	83	62	87	65	86	64
9					.27	56	23	85	54	74	49	78	57	77	55
10		.30	.26			59	32	82	60	65	47	80	53	71	49
11		.66	.69	T	.05	64	33	70	61	53	48	79	46	73	55
12	T	1.08			.95	59	40	62	48	70	39	87	59	68	59
13	.38			T		45	32	66	38	73	49	87	65	72	51
14		.02	.01			66	28	55	45	70	57	80	55	75	48
15		1.25			.30	67	38	54	47	76	52	79	49	77	46
16		T			.30	45	26	65	46	81	55	85	58	76	51
17			.21	1.19	.01	74	36	75	44	62	53	77	66	68	52
18			T	1.12		83	41	78	44	71	49	84	61	67	45
19	T	T				85	44	67	43	72	43	81	52	66	45
20	T			.09		69	53	61	36	84	53	87	54	69	42
21	.02		.22		.03	66	37	71	39	70	52	74	53	76	58
22	T	T			.05	55	41	76	57	72	46	80	48	74	61
23	T			.10	.08	58	37	80	50	68	42	93	61	73	55
24	.11	.01		.06		63	28	80	56	77	47	73	60	74	53
25	.09	T	.03			51	32	76	56	88	59	80	55	76	48
26				.45		47	32	68	52	71	55	77	50	81	54
27			.02	.75		67	36	65	46	59	50	85	59	75	49
28		.01	T		.23	82	44	73	54	60	48	76	54	61	49
29		.36			.02	87	54	71	57	73	51	73	47	65	54
30		1.29		.01	.01	65	48	75	53	81	51	70	58	73	57
31	.03	.01						67	52			77	51	80	57

CLIMATIC DATA - CROOKSTON

Date	Precipitation					Temperature									
	April	May	June	July	Aug.	April Max.	April Min.	May Max.	May Min.	June Max.	June Min.	July Max.	July Min.	August Max.	August Min.
1						44	35	73	47	53	37	76	53	81	60
2						53	32	78	49	61	35	79	59	81	61
3					.68	42	25	83	60	65	45	85	57	80	66
4						37	26	91	40	61	35	77	54	76	64
5						40	28	72	41	69	51	85	58	80	60
6						44	26	65	34	81	58	89	58	80	53
7						38	21	73	45	84	59	95	57	81	56
8	.01			.06	.21	36	23	89	45	83	58	85	58	88	62
9				.02		54	31	82	50	71	45	77	53	68	47
10		.34			.04	55	20	85	58	68	45	73	42	73	53
11		.36	.03		.39	62	40	69	45	56	39	73	50	64	54
12		.96			.39	55	35	52	40	72	40	85	65	64	55
13	.07					52	31	66	40	73	50	83	55	67	47
14	.01	.40	.22			65	37	57	47	66	54	76	49	73	44
15		1.09	.02			62	29	52	44	75	56	78	52	78	49
16				1.20	2.00	49	30	66	44	75	52	85	61	78	55
17			.03	.13	.06	65	42	78	43	64	53	74	61	63	48
18						80	42	81	46	70	43	81	53	63	42
19						84	56	65	34	73	50	81	53	65	41
20	.13			.42		67	39	62	34	80	59	76	54	79	42
21			1.08			70	41	71	50	64	46	71	43	75	57
22	.25				.05	57	43	77	49	65	43	77	51	79	56
23				.86	.11	60	32	82	58	68	43	83	59	70	56
24	.06	.23	.06			63	38	79	57	72	56	77	50	74	48
25		.02	.58	.12		46	29	61	55	83	53	76	49	78	56
26			.03			49	37	69	52	68	52	77	58	80	47
27			.25			67	44	67	55	56	48	83	54	73	46
28		.07	.01		.35	83	53	67	55	63	50	74	47	61	51
29		.07				87	44	69	46	71	47	75	51	71	47
30	.13	1.18	.02		.01	66	35	76	48	80	60	72	46	71	50
31		.04			.02			67	47			79	51	72	48

CLIMATIC DATA - MINOT

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			T			44	21	66	37	71	37	79	54	72	46
2						50	26	77	44	56	38	78	55	76	53
3					.82	50	31	81	42	61	43	88	58	72	57
4			.23		.23	48	26	89	48	62	33	88	54	72	58
5	T				.04	42	27	70	40	62	35	82	57	78	55
6	T					43	27	65	36	69	47	91	60	86	54
7	.06				T	44	23	60	34	78	54	94	59	81	53
8	T		T			41	17	71	35	85	54	91	55	80	53
9		T				43	25	87	53	73	46	91	58	87	49
10		.01				64	30	80	51	71	42	77	58	60	42
11		.10	.34			60	31	86	51	70	44	83	55	74	52
12		1.87	.14		.47	67	38	57	42	55	38	85	55	65	54
13	.35	.04			.15	45	30	59	40	68	43	91	58	64	44
14		.04	.02			62	38	51	36	66	47	81	55	65	44
15					T	79	36	59	36	75	48	74	49	70	44
16			T			60	31	62	38	80	55	82	51	77	46
17	.03		.06	.17	2.12	50	24	70	41	70	49	89	57	59	51
18	T		.03	1.37	.03	77	31	76	48	58	50	79	57	65	42
19			.12	.01		73	42	81	42	70	46	73	49	67	40
20	.70					80	42	67	36	75	52	83	52	67	41
21	T		.02			55	36	67	37	85	57	75	51	73	46
22	.21		T		T	51	34	82	48	70	43	79	55	81	56
23					.04	63	31	80	48	80	40	92	59	73	53
24					T	65	34	84	50	73	52	77	52	65	51
25	.55		.40	.05	T	54	31	80	44	74	54	67	51	72	51
26			.12		T	50	26	62	49	65	46	76	48	77	54
27			.48			47	29	67	51	65	48	82	54	77	48
28		.30	.66		T	72	43	66	48	54	43	82	55	76	52
29		.01	.24		.13	83	51	72	47	52	44	73	47	63	48
30		.04	T	.02		74	37	75	54	64	47	70	49	68	49
31		1.20		.11	.03			65	46			69	46	78	57

CLIMATIC DATA - WILLISTON

Date	Precipitation					Temperature									
	April	May	June	July	Aug.	April		May		June		July		August	
						Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1			.05			56	26	80	43	69	35	84	54	82	56
2					.01	56	36	80	44	62	38	96	59	83	62
3			.07		.41	52	32	89	60	63	42	98	56	80	58
4	.04				.38	43	29	88	50	60	32	92	54	77	59
5	.14					42	14	64	40	75	43	98	56	87	58
6	.02					41	29	63	34	78	57	100	64	86	55
7	.02					41	27	75	35	88	51	100	66	84	55
8					.18	49	18	85	52	88	59	98	62	84	64
9						68	26	84	54	74	45	96	60	81	47
10			.10			67	31	77	54	73	44	93	59	76	46
11		.01				68	34	68	50	59	40	99	63	76	53
12	.01	.15			T	67	44	60	46	74	37	100	60	68	54
13		.20	.06		T	68	31	57	40	81	57	100	62	65	49
14				.01		78	42	69	36	75	55	83	52	73	45
15						71	38	71	39	85	51	89	50	80	48
16					.42	62	31	73	40	85	53	90	62	79	55
17				.05	.74	76	44	76	43	71	52	90	61	62	48
18	.08			.87		73	50	81	48	70	49	78	56	69	43
19	.03					71	46	81	40	82	46	87	52	70	45
20	.44					66	37	78	49	87	54	87	54	74	52
21					T	59	31	86	50	86	56	85	56	85	59
22					T	62	30	84	54	81	43	102	62	84	52
23				T	.15	65	35	87	51	80	44	101	67	71	52
24	.25			.41		64	33	87	58	86	61	76	54	77	49
25	.13	.06	.68	.10		53	34	87	50	86	47	74	53	90	53
26						53	31	71	46	68	42	88	54	91	57
27		T				74	36	64	51	63	50	89	58	79	52
28		.03	.03		.20	84	45	75	50	58	44	84	52	78	53
29			.10		T	83	48	77	48	64	44	76	53	76	52
30		.93		.04		70	45	78	51	83	47	67	56	91	53
31				T				72	41			68	51	91	57

CLIMATIC DATA - LANGDON

	Precipitation					Temperature									
						April		May		June		July		August	
Date	April	May	June	July	Aug.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1			.32	.54		37	22	63	35	62	35	75	53	77	50
2		T				49	30	73	44	47	33	72	49	78	57
3				.01	.10	54	31	72	45	57	36	78	57	78	61
4			T	.05	.33	41	20	79	52	64	34	82	52	71	61
5					1.21	32	22	88	37	56	33	76	54	69	61
6			T			38	25	67	41	70	47	84	60	77	57
7						38	23	58	34	76	52	89	61	76	52
8			.13			33	17	71	35	80	60	90	54	75	52
9				.02		36	21	89	56	76	48	80	56	85	50
10			.01	.01	.17	57	31	80	50	67	40	74	53	58	38
11		.40	.46	.06	.01	54	29	79	54	62	44	70	45	67	49
12		.36	.28		1.00	61	35	60	42	59	41	77	53	63	52
13	.14	.56			.61	46	30	50	36	66	46	83	61	63	51
14				.02	.02	58	35	58	32	72	47	79	52	59	46
15			.27	.06	.02	75	34	55	40	64	54	70	46	66	42
16			.33			60	29	58	39	71	54	77	52	69	46
17			.04	.63	2.74	42	29	67	46	65	44	86	56	64	49
18			.14		.21	66	38	75	41	60	48	72	57	54	42
19				.04		71	42	79	39	65	42	76	49	57	38
20	.12			.11		76	50	63	30	72	51	79	51	64	40
21	.01		.15			59	31	69	37	79	57	70	47	66	47
22	.01		.03		.04	59	31	75	47	62	40	69	46	69	51
23					.28	63	33	78	46	68	43	81	55	74	51
24		.05			.02	62	30	83	51	67	43	81	51	64	52
25	.06		1.04			60	35	71	46	63	54	68	46	71	47
26	.04		.28			38	26	57	46	67	47	76	44	74	51
27			.14		T	45	30	62	37	63	49	76	53	76	44
28		.04	1.05			66	38	66	46	52	45	79	48	68	43
29		.36	.08		.10	85	51	68	52	61	46	68	39	58	41
30		.37	T			85	36	64	47	61	49	72	49	66	45
31		.76			.25			62	42			74	48	71	53

CLIMATIC DATA - CARRINGTON

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						49	31	78	39	69	39	80	51	77	51
2						52	32	80	41	59	34	85	50	78	53
3					.51	48	31	88	48	62	37	89	65	77	62
4			.13		.03	44	23	86	55	59	37	88	55	75	57
5			.03			42	21	67	39	68	35	88	50	83	60
6		T	.32			42	26	65	38	76	56	93	57	83	59
7						38	23	71	33	84	55	97	56	82	53
8	T					39	14	89	42	83	62	89	57	91	55
9						62	22	87	52	83	47	89	56	90	53
10		.06				62	28	85	48	64	47	84	50	74	38
11		1.02	.52		.27	65	27	71	58	64	45	83	50	67	53
12	.08	1.01	.04		.80	62	42	60	57	66	37	90	54	64	57
13	.15					58	34	59	37	73	47	90	64	67	49
14			.12			81	32	54	37	75	55	73	52	72	44
15		T				76	32	54	43	78	49	82	47	77	46
16					.27	56	27	68	40	77	59	87	49	75	50
17			.22	.54		73	25	75	40	65		87	59	65	49
18			.48	.15	.81	77	46	80	46	68	51	77	58	64	40
19	T		.24			82	38	79	43	73	42	81	48	65	36
20						75	44	65	34	84	46	82	52	71	38
21	.03		.74			73	28	76	40	75	48	78	48	76	55
22					.39	64	30	76	48	68	43	88	49	76	57
23					.40	63	33	82	44	69	39	88	69	75	47
24	T	.09				62	26	82	54	70	39	81	60	69	54
25	.04	.09	.05			46	26	71	54	77	42	78	49	73	44
26						47	21	66	45	77	42	81	49	78	56
27			.41	.15		69	22	64	45	60	50	82	58	78	45
28		.48	.15			84	41	68	47	53	44	76	48	69	49
29		.30	T		.15	87	46	71	56	65	44	71	41	67	48
30		.54		.13		85	41	72	50	80	51	71	54	73	47
31		.23			.08			69	48			75	41	74	64

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 & 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
Cosf = Volunteer sunflower
Dobr = Downy brome
Fach = False chamomile
Fipc = Fieldpennycress
Flwe (Flix) = Flixweed
Foba = Foxtail barley
Fomi = Foxtail millet
Fxtl = Foxtail species
Grft = Green foxtail
Grpw (Gfpw) = Greenflower pepperweed
Howe = Horseweed
KOCZ = Kochia
Lent = Lentils
Lesp = Leafy spurge
Mael = Marshelder
Mesa = Meadow salsify
Nfcf = Nightflowering catchfly
Pest (Soth) = Perennial sowthistle
Pesw = Pennsylvania smartweed
Powe = Pondweed
Prlt = Prickly lettuce
Prpw = Prostrate pigweed
Qugr = Quackgrass
Rrpw = Redroot pigweed
Ruth = Russian thistle
Soyb (Sobe) = Soybean
Spkw = Spotted knapweed
Sugb (Sube) = Sugarbeet
Sunfl (Sufl, Cosf) = Sunflower
Tamu = Tansy mustard
Taoa = Tame oat
Tumu = Tumble mustard
Tymu = Tame yellow mustard
Vowh = Volunteer wheat
Wesa = Western salsify
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 (inj) = Percent injury rating
%sr (%std,strd) = Percent stand reduction
HT = Plant height
dma = Dimethylamine
bee = Butoxyethanol ester
UC = Union Carbide
RH = Rohm and Haas
POSS, PO, OC = Petroleum oil concentrate (17% emulsifier)
SPK = Spike stage
SURF, S = Surfactant
Tswt (TW) = Test weight
WP = Wettable power
WK = surfactant by DuPont
X-77 = Surfactant by Ortho
Yld = Yield
RP = Rhome-Poulenc

LIST OF HERBICIDES TESTED IN 1985

Common Name or Code Name	Abbre- viation[a]	Chemical Name	Trade Name
AC-22,293	None AC293	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
AC-263, 499	AC-499	5-ethyl-2-(4-isopropyl-4-methyl-5-oxy-2-imidazolin-2-yl)-nicotinic acid	None
AC-252, 925		2-(4-isopropyl-4-methyl-5-oxy-2-imidazolin-y-yl)nicotinic acid	Arsenal
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
Atrazine	Atra	2-chloro-4-(ethylamino)-6-(isopropyl)-amino)-s-triazine	AAtrex
BAS-14001H		Not released	None
BAS-04408H		" "	None
BAS-03701H		" "	None
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

Common Name or Code Name	Abbre-viation[a]	Chemical Name	Trade Name
Butylate	Buty	S-ethyl diisobutylthiocarbamate	Sutan
CGA-24704		Not released	
Chloramben	Clam	3-amino-2,5-dichlorobenzoic acid	Amiben
Chlorpropham	CIPC	isopropyl-m-chlorocarbanilate	Furloe
Chlorsulfuron	Clsu	2-chloro-N-[[(4-methoxy-6-methyl-1,3,5-triazine-2-yl)amino]carbonyl] benzene-sulfonamide	Glean
Cinmethylin	Cinm	exo-1-methyl-4-(111-methyl-ethyl)-2-[(2-methylphenyl)methoxy]-7-oxa bicyclo	Cinch
Clopropoxydim	Clop	(E,E)-2-1[111[1-[[(3-chloro-2-propanyl)oxy]imino]butyl]-5-[2-ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one	Selectone
Clopyralid	Clpg	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
Diclofop	Dicl	2-[4-(2,4-dichlorophenoxy)phenoxy] propanoic acid	Hoelon
Diethatyl	Diet	N-(chloroacetyl)-N-(2,6-diethylophenyl)-glycine	Antor
Difenzoquat	Dife	1,2-dimethyl-3,5-diphenyl-1H-pyrazolium	Avenge

Common Name or Code Name	Abbre-viation[a]	Chemical Name	Trade Name
Dikegulac sodium	None	2,3:4,6-bis-o-[1-methylylethylidene] -a-L-xylo-2-hexulofuranosonic acid	Atrinal
Dinoseb	Dino	2-sec-butyl-4,6-dinitrophenol	Dow General, Premerge
Diuron	Diur	3-(3,4-dichlorophenyl)-1,1-dimethylurea	Karmax
DPX-F6025		Ethyl-2-[[[[4-chloro-6-methyl-oxypyridmidin-2-yl]amino]carbonyl] amino]sulfonyl]benzoate	Classic
DPX-L5300		Not released	None
DPX-R9674		" "	None
DPX-E8698		" "	None
DPX-R9521		" "	None
DPX-T6376	Mets	2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino] sulfonyl]benzoic acid	Ally/ Escort
DPX-Y6202		2-[4-(6-chloro-2-quinoxalinyl)oxy] phenoxy propionic acid ethyl ester	Assure
DPX-M6316	DPX-M6	Not released	Harmony
EL-103	None	Not released	None
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-(trifluromethyl) benzenamine	Sonalan
Ethofumesate	Etho	(±)2-ethoxy-2,3-dihydro-3,3-dimethyl -5-benzofuranyl methanesulfonate	Nortron
Fenac		(2,3,6-trichloropenyl)acetic acid	Fenatrol
Fenoxaprop	Feno	(±)-2-[4-[(6-chloro-2-benzoxazolyl) oxy]phenoxy]propionic acid	Whip
Fluazifop	Flua, Flua-4	(±)-2-[4-[[5-corifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanic acid	

Common Name or Code Name	Abbre-viation[a]	Chemical Name	Trade Name
Fluorochloridone	Fluo	3-chlor-4-(chloromethyl)-1-[3-(trifluoromethyl)phenyl]-2-pyrrolidinone	Racer
Fluroxypyr	Flox	4 amino-3,5-dichloro-6-fluro-2-pyridloxyacetic acid	Sturane
FMC-57020		2-(2-chlorophenyl)methyl-4,4-dimethyl-3-isoxozalidinone	Command
Fomesafen	Fame	5-[2-chloro-4-(trifluormethyl)phenoxy]-N-(methylsulfonyl)-2-nitrobenzamide	Reflex
Glyphosate	Glyp	N-(phosphonomethyl)glycine	Roundup
Haloxyfop	Halo	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 7115-02H HOE 7115-01H HOE 7117-01H HOE 7117-02H			
Imazaquin	Imaq	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-quinolinecarboxylic acid	Scepter
Isoxaben		N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide	
Lactofen	Lact	1'-(carboxyethexy)ethyl 5-3-chloro-4-(trifluoromethyl)phenoxy-2-nitrobenzoate	Cobra
Linuron	Linu	3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea	Lorox
MCPA	None	[(4-chloro-o-tolyl)oxy]acetic acid	Numerous
MCPP	None	2-[(4-chloro-o-tolyl)oxy]propionic acid	Numerous
Metamitron		4-amino-3-methyl-6-phenyl-1,2,4-triazin-5(4H)-one	Goltix

Common Name or Code Name	Abbreviation[a]	Chemical Name	Trade Name
Methazole	None	2-(3,4-dichlorophenyl)-4-methyl -1,2,4-oxazoline-3,5-dione	Probe
Methazone	None	2-(3,4-dichlorophenyl)-4-methyl -1,2,4-oxadiazoline-3,5-dione	Probe
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/ Escort
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-trichlor-2-pyridine carboxylic acid	Tordon
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	Ramrod
Propanil	Prnl	3',4'-dichloropropionanilide	Stampede
Pyrazon	Pyra	5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone	Pyramin
R-25788, Dichlormid		2,2-dichloro-N,N-di-2-proycryl-acetamide	None
R-33865, Dietholate	Ext	O,O-diethyl-O-phenyl	None

Common Name or Code Name	Abbreviation[a]	Chemical Name	Trade Name
RE-408825	None	Not released	None
SAN-568	None	Not released	None
SC-0051	None	Not released	None
SC-0224, sulphosate	Sulp	trimethylsulfarium carbonymethyl-aminomethyl phosphosate	Touchdown
SC-1084	None	Not released	None
SC-15574	None	Not released	None
Sethoxydim	Seth	2-(N-ethoxybutyrimidoyl)-5-(2-ethylthiopropyl)-3-hydroxy-2-cyclohexen-1-one	Poast
TCA	None	trichloroacetic acid	None
Tebuthiuron	Tebu	N-[5-(1,1-dimethylethyl)-1,3,4-thindiazol-2-yl]-NN'-dimethylurea	Spike
Terbutryn	Terb	2-(tert-butylamino)-4-(ethylamino)-6-(methylthio)-s-triazine	Igran
Triallate	Tria	S-(2,3,3-trichloroallyl)diisopropyl-thiocarbamate	Far-go
Tridiphane	Trid	2-(3,5-dichlorophenyl)-2-(2,2,2-trichloroethyl)oxiane	Tandem
Triclopyr	Tric	[(3,5,6-trichloro-2-pyridiryl)oxy] acetic acid	Garlon
Trifluralin	Trif	α,α,-trifluoro-2,6-dinitro-N-N-dipropyl-p-toluide	Treflan
2,4-D	None	(2,4-dichlorophenoxy)acetic acid	Numerous
2,4-DP	None	2-(2,4-dichlorophenoxy)propionic acid	None
Vernolate	Vern	S-propyl dipropythiocarbamate	Vernam

[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	N (lb/A)	P (lb/A)	K (lb/A)
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	3.1	7.9	122	40	1795
Crookston, MN	Silt loam	4.3	7.8	135	28	285
St. Thomas, ND	Silt loam	3.6	7.9	65	11	380
Argyle, MN	Silty clay loam	3.8	7.8	60	69	720
Clara City, MN	Loam	4.2	7.7	194	19	270
Hillsboro, ND	Silty clay	3.6	7.8	112	23	440
Colfax, ND	Silt loam	6.4	7.6	407	145	4600
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		

Preplant incorporated herbicides, Argyle, 1985. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots April 29 when the air temp.=78F, soil temp. at six inches=54F, wind was south at 12 mph, soil surface was dry, 1-2 inches was moist, and 2-4 inches was wet. Incorporation was with a rototiller set four inches deep for treatments containing EPTC or cycloate and 2 inches deep for all other treatments. Beta 1230 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 29. Redroot pigweed, Pennsylvania smartweed, wild oat, and green foxtail control and sugarbeet injury were evaluated July 8.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Redroot Pigweed control rating	Pennsylv. Smartweed control rating	Wild Oats control rating	Green Foxtail control rating
		(%)				
EPTC	2	5	66	33	81	96
EPTC	3	14	65	41	91	99
EPTC+extender	2	5	63	29	74	98
EPTC+extender	3	9	55	35	92	99
Cycloate+EPTC	2+2	8	76	73	88	99
Cyclo+EPTC+extender	2+2	15	88	66	97	99
Ethofumesate	3.75	3	99	97	93	99
Diethatyl	6	3	98	74	95	99
Diethatyl+Cycloate	4+3	24	99	96	97	99
Diethatyl+Diallate	4+4	18	97	81	99	99
Diethatyl+Diallate	4+2	16	97	88	99	98
FMC-57020	1	35	30	95	99	99
Diallate	4	3	15	8	99	96
EPTC+Diallate	2+4	28	51	53	99	99
EPTC+Diallate	2+2	10	58	51	99	99
Mean		13	70	61	93	98
High mean		35	99	97	99	99
Low mean		3	15	8	74	96
Coeff. of variation		62	15	21	8	2
LSD(1 Percent)		15	20	25	14	3
LSD(5 Percent)		11	15	19	10	2
No. of reps		4	4	4	4	4

Summary

EPTC+extender (R-33865) gave weed control similar to EPTC. Cycloate+EPTC gave better control of Pennsylvania smartweed than EPTC. Only ethofumesate, diethatyl+cycloate, and FMC-57020 gave over 95% control of Pennsylvania smartweed. Diallate at 4 lb/A gave 96% control of green foxtail but only 15% control of redroot pigweed. EPTC + diallate at 4 lb/A gave more sugarbeet injury than EPTC+diallate at 2 lb/A. FMC-57020 caused the greatest sugarbeet injury. Ethofumesate and diethatyl gave nearly total control of redroot pigweed. All combinations with diethatyl caused more sugarbeet injury than diethatyl alone.

Preplant incorporated herbicides, Clara City, 1985. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots May 6 when the air temp.=74F and the wind was west at 15 mph. Incorporation was with a roto-tiller operated four in. deep for treatments containing EPTC or cycloate and two inches deep for all other treatments. Beta 1132 sugarbeet was seeded 1.25 inches deep in 22 in. rows May 7. Green and yellow foxtail, common lambs-quarters, and buffalo bur control and sugarbeet injury were evaluated June 25.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Foxtail control rating	Common Lambsquarters control rating	Buffalo Bur control rating
		--------	--------	(%)	--------
EPTC	2	10	95	33	99
EPTC	3	3	98	28	96
EPTC+extender	2	0	97	46	96
EPTC+extender	3	9	99	61	99
Cycloate+EPTC	2+2	5	99	76	83
Cyclo+EPTC+extender	2+2	25	99	84	95
Ethofumesate	3.75	3	81	79	71
Diethatyl	6	32	91	45	98
Diethatyl+Cycloate	4+3	19	99	66	97
Diethatyl+Diallate	4+4	61	99	87	83
Diethatyl+Diallate	4+2	40	91	76	93
FMC-57020	1	55	97	96	89
Diallate	4	14	95	90	38
EPTC+Diallate	2+4	26	98	91	98
EPTC+Diallate	2+2	23	98	89	73
Mean		22	96	70	87
High mean		61	99	96	99
Low mean		0	81	28	38
Coeff. of variation		85	5	32	23
LSD(1 Percent)		35	10	42	46
LSD(5 Percent)		26	7	32	34
No. of reps		4	4	4	3

Summary

EPTC+extender (R-33865) gave weed control similar to EPTC alone. Cycloate+ EPTC gave better common lambsquarters control than EPTC at 2 or 3 lb/A. Diallate at 4 lb/A gave 90% control of common lambsquarters. Several treatments gave good control of buffalo bur. Ethofumesate and diallate tended to be less effective than EPTC, FMC-57020, or diethatyl. Diethatyl at 6 lb/A, diethatyl+ diallate, and FMC-57020 caused or tended to cause more sugarbeet injury than other treatments.

Preplant incorporated herbicides, Colfax, 1985. Herbicides were applied in 17 gpa water at 40psi to the center four rows of six row plots May 7 when the air temp.=71F, soil temp. at 6 inches=56F, wind was northeast at 3-5 mph, and soil surface was dry and 1 - 4 inches was moist. Incorporation was with a rototiller operated four inches deep for treatments containing EPTC or cycloate and 2 inches deep for all other treatments. Bush Johnson 19 was seeded 1.25 inches deep in 22 inch rows May 7. Redroot pigweed and foxtail barley control and sugarbeet injury were evaluated June 22.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Redroot Pigweed control rating	Foxtail Barley control rating
		-----	(%)	-----
EPTC	2	5	59	98
EPTC	3	8	87	99
EPTC+extender	2	5	76	96
EPTC+extender	3	10	88	99
Cycloate+EPTC	2+2	10	88	99
Cyclo+EPTC+extender	2+2	14	91	99
Ethofumesate	3.75	3	95	85
Diethatyl	6	8	92	99
Diethatyl+Cycloate	4+3	3	92	99
Diethatyl+Diallate	4+4	3	91	99
Diethatyl+Diallate	4+2	10	84	98
FMC-57020	1	50	68	96
Diallate	4	0	1	64
EPTC+Diallate	2+2	3	69	99
EPTC+Diallate	2+4	15	75	99
Mean		10	77	95
High mean		50	95	99
Low mean		0	1	64
Coeff. of variation		77	14	8
LSD(1 Percent)		14	20	15
LSD(5 Percent)		11	15	11
No. of reps		4	4	4

Summary

FMC-57020 gave poor redroot pigweed control and severe sugarbeet injury. EPTC at 2 lb/A plus extender (R-33865) gave greater redroot pigweed control than EPTC at 2 lb/A without extender. Ethofumesate and diallate gave less control of foxtail barley than the other treatments.

Preplant incorporated herbicides, Hillsboro, 1985. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots May 9 when the air temp. = 85 F, wind was north 5 - 10 mph, and the top 2 inches of soil was dry with moist soil at 2-4 inches. Herbicides were incorporated with a rototiller operated four inches deep for treatments containing EPTC or cycloate and operated two inches deep for all other treatments. Bush Johnson 19 sugarbeet was seeded 1.25 inches deep in 22 inch rows May 9. Wild mustard and green and yellow foxtail control and sugarbeet injury were evaluated July 15.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Wild Mustard control rating	Gr.&Ye. Foxtail control rating
		(%)		
EPTC	3	0	0	83
EPTC+extender	3	0	0	90
EPTC+Cycloate	2+2	0	0	93
EPTC+extender+Cycloate	2+2	0	28	97
Cycloate	4	0	0	93
Ethofumesate	3.75	0	68	69
Diethatyl	6	0	0	79
Ethofumesate+Cycloate	3+3	0	66	96
Ethofumesate+Cycloate	3.75+4	0	76	97
Diethatyl+Cycloate	4+3	0	0	90
Ethofumesate+Diallate	3.75+4	0	70	90
Ethofumesate+Diallate	3.75+2	0	55	86
Ethofumesate+TCA	3.75+6	0	66	75
Diallate	4	0	0	88
Ethofumesate+Metamitron	3.75+4	0	85	61
FMC-57020	1	8	5	87
Metamitron	6	0	88	11
Metolachlor	3	0	6	92
Mean		0	34	82
High mean		8	88	97
Low mean		0	0	11
Coeff. of variation		849	35	12
LSD(1 Percent)		7	22	19
LSD(5 Percent)		5	17	14
No. of reps		4	4	4

Summary

Only FMC-57020 caused visible sugarbeet injury. Metamitron gave greater control of wild mustard than the other treatments. EPTC + extender (R-33865) gave foxtail control similar to EPTC alone. Metolachlor gave 92% control of foxtail without sugarbeet injury. Ethofumesate+diallate or ethofumesate+cycloate gave better foxtail control than ethofumesate alone.

Simulated soil residues in weed free sugarbeets, Fargo, 1985. Herbicides were applied in 17 gpa water at 40 psi to four row plots April 30 when the air temp. was 70F, wind was northwest at 13 mph, and the soil temp. at six inches was 55F. Herbicides were incorporated with an Alloway Seedbetter set 2 inches deep. Great Western Mono-Hy R-103 was planted 1.25 inches deep in 22 inch rows April 30. Plots were hand thinned to an 8 inch spacing and hand weeded June 2 and were maintained weed free throughout the growing season. Sugarbeet injury was evaluated June 19. Sugarbeets were harvested from 52 feet of the center two rows of each plot September 24.

Treatment	Rate (lb/A)	Sgbt inj ratg (%)	Sucros (%)	Root Yield (ton/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popul per 52 ft.
Trifluralin	.05	2	17.4	21.6	648	1.5	6802	63
Trifluralin	.1	9	17.1	23.1	783	1.8	6971	66
Trifluralin	.15	17	16.9	23.1	808	1.9	6873	64
Trifluralin	.2	24	16.2	22.8	904	2.0	6412	55
Trifluralin	.3	40	16.4	18.1	882	2.0	5144	43
Trifluralin	.4	53	16.2	17.9	980	2.1	4963	37
Ethalfluralin	.05	0	17.0	22.3	793	1.8	6686	58
Ethalfluralin	.1	11	16.7	21.8	807	1.8	6402	62
Ethalfluralin	.15	16	16.3	21.5	886	2.0	6109	63
Ethalfluralin	.2	27	16.2	21.5	966	2.1	5907	52
Ethalfluralin	.3	50	15.8	17.2	1027	2.2	4626	36
Ethalfluralin	.4	53	16.4	17.9	910	2.0	5019	35
Pendimethalin	.05	0	16.6	22.9	857	1.9	6630	65
Pendimethalin	.1	7	17.1	19.9	721	1.7	6063	61
Pendimethalin	.15	21	16.0	22.6	973	2.1	6178	61
Pendimethalin	.2	23	16.5	20.5	863	1.9	5885	59
Pendimethalin	.3	33	16.6	19.8	873	2.0	5710	51
Pendimethalin	.4	47	16.3	18.6	942	2.1	5194	41
Untreated Check	.	4	16.3	22.3	968	2.1	6196	61
Atrazine-L	.05	4	17.1	20.8	767	1.8	6285	59
Atrazine-L	.1	2	16.4	21.5	860	1.9	6165	67
Atrazine-L	.15	4	17.1	23.2	712	1.7	7060	63
Atrazine-L	.2	10	17.0	22.7	776	1.8	6844	60
Atrazine-L	.3	18	17.0	22.4	759	1.7	6748	63
Dicamba	.05	6	16.6	22.1	843	1.9	6425	64
Dicamba	.1	23	17.0	21.9	738	1.7	6645	59
Dicamba	.2	43	16.7	19.8	764	1.7	5855	48
Dicamba	.4	74	16.3	15.0	972	2.1	4230	35
Picloram	.008	10	17.0	22.0	785	1.8	6594	65
Picloram	.016	28	16.5	20.4	886	2.0	5843	57
Mean		22	16.6	20.9	848	1.9	6082	56
High mean		74	17.4	23.2	1027	2.2	7060	67
Low mean		0	15.8	15.0	648	1.5	4230	35
Coeff. of variation		41	3.4	11.0	16	13.4	12	12
LSD(1 Percent)		15	0.9	3.8	224	0.4	1182	11
LSD(5 Percent)		11	0.7	2.9	169	0.3	895	8
No. of reps		5	5.0	5.0	5	5.0	5	5

Summary

Extractable sucrose/A tended to be reduced by trifluralin at 0.2 lb/A, ethalfluralin at 0.1 lb/A, and pendimethalin at 0.1 lb/A. Atrazine at 0.3 lb/A did not cause yield loss. Dicamba at 0.2 lb/A and picloram at 0.016 lb/A tended to reduce extractable sucrose/A.

PPI and postemergence herbicides on weed free sugarbeets, Fargo, 1985. All treatments were applied in 17 gpa water at 40 psi to four row plots. Preplant incorporated herbicides were applied April 30 when the air temp. was 70F, soil temp. at six inches was 55F, and wind was from the northwest at 13 mph. EPTC+ cycloate was incorporated with a rototiller set four inches deep and all other soil applied treatments were incorporated with an Alloway Seedbetter set two inches deep. GW Mono-Hy R-103 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 30. Postemergence treatments were applied June 20, June 26, and July 1. Weather information follows:

Date	Time of Day	Air Temp (degF)	Soil Temp at six inches (degF)	Relat Humid (%)	Wind Direct	Wind Speed (mph)	Sgbt Leaf Stage
June 20	4:30 pm	84	71	44	SE	20	6-10
June 26	1:30 pm	72	64	57	N	9	8-10
July 1	5:30 pm	84	70	44	N	12	10-12

Soil moisture June 20 was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. Soil moisture June 26 and July 1 was dry on the surface and wet below the surface. Sugarbeets were hand weeded and hand thinned to an 8 inch spacing June 2 and plots were maintained weed free throughout the growing season. Sugarbeet injury was evaluated June 19 before postemergence treatments were applied. Sugarbeets were harvested from 56 feet of the center two rows of each plot September 24.

Treatment*	Rate (lb/A)	Sgbt inj ratg (%)	Sugr (%)	Root Yield ton/A	Impur Index	Loss to Mol (%)	Extr Sucr lb/A	Sgbts per 52ft.
Acetochlor	2	55	15.2	19.9	1183	2.4	4997	39
Acetochlor	3	70	14.6	19.8	1254	2.5	4689	31
Alachlor	2	32	15.5	22.4	1101	2.3	5812	51
Alachlor	3	48	15.6	20.7	1074	2.3	5433	43
Alachlor	4	60	15.3	19.8	1128	2.3	5020	35
Metolachlor	2	10	15.6	22.2	1103	2.3	5790	64
Metolachlor	3	10	15.6	22.8	1105	2.3	5984	61
Metolachlor	4	22	15.5	23.2	1107	2.3	5973	58
Diallate	2	6	15.6	22.1	1107	2.3	5784	62
Diallate	4	4	16.1	21.4	983	2.1	5860	61
Diallate	6	18	15.7	22.1	1094	2.3	5817	63
FMC-57020	.5	8	15.9	22.0	1065	2.3	5874	64
FMC-57020	1	22	15.3	21.8	1110	2.3	5565	65
FMC-57020	2	36	16.2	20.7	926	2.0	5771	58
Untreated Check	.	5	15.8	22.4	1055	2.2	5985	65
EPTC+Cycloate	2+2	21	15.8	21.6	1054	2.3	5770	66
Diethatyl	6	5	16.2	22.0	973	2.1	6112	64
EPTC+Cyc/Des 2X/Des+Dala	2+2/.75/1+2	25	15.7	19.3	1006	2.1	5126	60
EP+Cy/De 2X/De+Se+O	2+2/.75/1+.2+.25G	28	15.9	20.5	984	2.1	5541	57
Diet/Desm 2X/Desm+Dalapon	6/.75/1+2	11	15.5	20.4	1086	2.3	5327	64
Diet/De 2X/De+Seth+OC	6/.75/1+.2+.25G	8	15.9	21.7	1041	2.2	5815	64

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Treatment*	Rate (lb/A)	Sgbt inj ratg (%)	Sugr (%)	Root Yield ton/A	Impur Index	Loss to Mol (%)	Extr Sucr lb/A	Sgbts per 52ft.
Mean		24	15.7	21.4	1073	2.3	5621	57
High mean		70	16.2	23.2	1254	2.5	6112	66
Low mean		4	14.6	19.3	926	2.0	4689	31
Coeff. of variation		43	4.6	7.9	15	10.5	10	11
LSD(1 Percent)		16	1.1	2.6	235	0.4	873	10
LSD(5 Percent)		12	0.8	1.9	178	0.3	661	7
No. of reps		6	6.0	6.0	6	6.0	6	6

* OC = Hopkin's Agicide Activator

Summary

Acetochlor caused more sugarbeet injury than alachlor and alachlor caused more injury than metolachlor. Sugarbeets treated with acetochlor at 2 or 3 lb/A or with alachlor at 4 lb/A yielded less extractable sucrose than the untreated check. All rates of acetochlor and alachlor reduced sugarbeet populations compared to the untreated check. Plots treated with desmedipham+dalapon at 1+2 lb/A yielded less extractable sucrose than the untreated check. Sugarbeets treated with FMC-57020 turned partially white early in the season but they recovered from that injury and no significant yield loss was measured.

Soil applied plus postemergence herbicides, Crookston, 1985. Preplant incorporated and preemergence herbicides were applied April 24 when the air temp. was 60F, soil temp. at six inches was 44F, wind was north at 10 mph, soil was dry on the surface, and moist at 1-4 inches. PPI herbicides were incorporated with a rototiller set four inches deep. Beta 1230 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 24. The first portion of three application postemergence treatments was applied 12:15 pm May 22 when the sky was partly cloudy, air temp. was 72F, soil temp. at six inches was 65F, rel. hum. was 57%, wind was east at 10 mph, sugarbeets had 2 leaves, green foxtail was 0.5-1.5 inches tall, prostrate and redroot pigweed were cotyledon to 2 leaf, and kochia had a rosette diameter of 0.5 to 1.5 inches. The second portion of three application postemergence treatments and the first portion of two application postemergence treatments were applied 12:30 pm May 28 when the sky was cloudy, air temp. was 64F, soil temp. at six inches was 65F, wind was southeast at 12 mph, relative humidity was 52%, soil was dry on surface, moist at 1-2 inches, wet at 3-4 inches, sugarbeets had 4-6 leaves, redroot pigweed was cotyledon to 6 leaf, prostrate pigweed was cotyledon to 1.5 inches tall, green foxtail was 1-3 inches tall, and kochia had a rosette diameter of 1-3 inches. The second portion of two application postemergence treatments was applied 12:30 pm June 3 when the sky was sunny, air temp. was 61F, soil temp. at six inches was 54F, rel. hum. was 54%, wind was southeast at 8 mph, soil was dry on surface, moist at 1-4 inches, and sugarbeets were in the six leaf stage. Weeds had grown very little since May 22 due to herbicide treatments. The final portion of three application postemergence herbicide treatments was applied 10:00 am June 7 when the air temp. was 78F, soil temp. at six inches was 62F, sky was sunny, wind was west at 12 mph, rel. hum. was 43%, sugarbeets remained in the six leaf stage with burned leaves due to herbicide injury, and most weeds in the treated plots had died. A second flush of green foxtail and redroot pigweed had appeared June 7 and were very small. Hand weeded check plots were weeded June 1 and kept weed free throughout the the growing season. Sugarbeets were hand thinned to an 8 inch spacing June 20. Sugarbeets were harvested October 1 from 30 feet of each of the center two rows of each plot. Prostrate pigweed and green foxtail control and sugarbeet injury were evaluated June 14. Redroot and prostrate pigweed, green foxtail, and kochia control and sugarbeet injury were evaluated July 19.

		-- June	14 --		------- July	19 -------			
		Sgbt inj ratg	Prpw cntl ratg	Grft cntl ratg	Sgbt inj ratg	Rrpw cntl ratg	Prpw cntl ratg	Kocz cntl ratg	Grft cntl ratg
Treatment**	Rate (lb/A)	-------	-------	-------	-------	(%)	-------	-------	-------
EPTC+Cycloate (PPI)	2+2	0	50	94	0	59	59	13	88
Diethatyl (Pre)	6	0	54	83	0	68	70	0	86
Ethofumesate (Pre)	3.75	0	81	66	0	70	55	54	56
Desmedipham&Phenmedipham 2X	.5	0	96	98	0	88	88	92	93
Des&Phen+Endothall 2X	.5+.25	1	93	97	0	81	75	87	84
Des&Phen 2X/Des&Phen+Dalapon	.5/1+2	43	99	99	10	88	88	96	98
De&Ph/De&Ph+Sethoxy+OC	.5/.5+.2+.25G	4	98	99	0	87	87	87	99
DP/DP+Se+O/DP+Et	.5/.5+.2+.25G/.8+1.2	50	99	99	20	94	94	99	99
D&P/D&P+Fluazifop+OC	.5/.5+.188+.25G	8	98	99	13	84	84	95	97
D&P/Seth+OC/D&P+Dala	.8/.2+.25G/1+2	51	99	99	26	87	88	96	98
DP+En/DP+En+S+O	.5+.25/.5+.25+.2+.25G	1	95	98	4	80	80	81	95

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Treatment**	Rate (lb/A)	June 14 Sgbt inj ratg	June 14 Prpw cntl ratg	June 14 Grft cntl ratg	July 19 Sgbt inj ratg	July 19 Rrpw cntl ratg	July 19 Prpw cntl ratg	July 19 Kocz cntl ratg	July 19 Grft cntl ratg
		(%)							
EPTC+Cycloate/Desmed&Phenmed 2X	*	6	99	99	0	93	95	92	98
EPTC+Cycloate/Des&Phen+Endothall 2X	*	4	99	99	0	89	89	91	98
EPTC+Cycl/De&Ph 2X/De&Ph+Dalapon	*	59	99	99	30	73	81	91	99
EPTC+Cycl/Des&Phen/De&Ph+Sethoxy+OC	*	5	99	99	6	92	92	96	98
EPTC+Cycl/D&P/D&P+Seth+OC/D&P+Etho	*	60	99	99	15	96	96	99	99
EPTC+Cycl/Des&Phen/Des&Phen+Flua+OC	*	3	99	99	0	86	86	85	99
EPTC+Cycl/De&Ph/Seth+OC/De&Ph+Dala	*	73	99	99	39	79	78	96	98
EPTC+Cycl/D&P+Endo/D&P+Endo+Seth+OC	*	3	99	99	5	86	86	91	99
Diethatyl/Desmed&Phenmed 2X	*	3	99	99	5	94	94	92	98
Diethatyl/Des&Phen+Endothall 2X	*	1	99	99	0	94	95	89	97
Diethatyl/De&Ph 2X/De&Ph+Dalapon	*	39	99	99	19	85	85	97	99
Diethatyl/De&Ph/De&Ph+Sethoxydim+OC	*	3	99	99	0	95	95	90	99
Diethatyl/D&P/D&P+Seth+OC/D&P+Etho	*	51	99	99	30	92	94	98	99
Diethatyl/Des&Phen/Des&Phen+Flua+OC	*	0	99	98	0	96	96	97	99
Diethatyl/De&Ph/Seth+OC/De&Ph+Dala	*	55	99	99	30	87	90	95	99
Diethatyl/D&P+Endo/D&P+Endo+Seth+OC	*	5	99	99	0	97	97	84	99
Ethofume/Desmed&Phenmed 2X	*	4	99	99	0	99	98	97	99
Ethofume/Des&Phen+Endothall 2X	*	6	99	98	6	98	98	96	99
Ethofume/De&Ph 2X/De&Ph+Dalapon	*	51	99	99	30	93	98	98	99
Ethofume/De&Ph/De&Ph+Sethoxydim+OC	*	9	99	99	0	98	98	97	99
Ethofume/D&P/D&P+Seth+OC/D&P+Etho	*	60	99	99	28	99	99	99	99
Ethofume/Des&Phen/Des&Phen+Flua+OC	*	4	99	99	5	99	99	97	99
Ethofume/De&Ph/Seth+OC/De&Ph+Dala	*	59	99	99	33	98	98	97	99
Ethofume/D&P+Endo/D&P+Endo+Seth+OC	*	13	99	99	14	90	90	94	98
Hand Weeded Check		0	0	0	5	99	99	99	99
Mean		20	93	95	10	89	89	88	96
High mean		73	99	99	39	99	99	99	99
Low mean		0	0	0	0	59	55	0	56
Coeff. of variation		39	5	4	80	9	8	6	4
LSD(1 Percent)		15	8	7	15	14	14	10	8
LSD(5 Percent)		11	6	5	11	11	10	8	6
No. of reps		4	4	4	4	4	4	4	4

* Herbicide rates are the same when applied in combination or alone.
** OC = Hopkin's Agicide Activator

Summary

The postemergence herbicides generally were quite phytotoxic in this experiment. For example, split applied desmedipham+phenmedipham gave over 90% control of green foxtail and kochia. Postemergence herbicides applied over the three soil applied treatments gave or tended to give better weed control than postemergence herbicides alone or soil applied herbicides alone. Plots treated with desmedipham+phenmedipham+dalapon or desmedipham+phenmedipham+ethofumesate had more sugarbeet injury than other plots.

Soil applied plus postemergence herbicides, Crookston, 1985. (continued)

Treatment**	Rate (lb/A)	Sucro (%)	Root Yield (ton/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popl per 60ft
EPTC+Cycloate (PPI)	2+2	16.5	10.6	731	1.6	3163	54
Diethatyl (Pre)	6	17.3	11.4	654	1.5	3540	52
Ethofumesate (Pre)	3.75	17.7	13.8	611	1.5	4454	60
Desmedipham&Phenmedipham 2X	.5	17.0	18.7	708	1.6	5619	54
Des&Phen+Endothall 2X	.5+.25	17.5	15.6	608	1.4	4974	60
Des&Phen 2X/Des&Phen+Dalapon	.5/1+2	16.2	17.2	816	1.8	4892	54
De&Ph/De&Ph+Sethoxy+OC	.5/.5+.2+.25G	17.4	17.5	644	1.5	5528	60
DP/DP+Se+O/DP+Et	.5/.5+.2+.25G/.8+1.2	16.2	18.4	797	1.8	5257	56
D&P/D&P+Fluazifop+OC	.5/.5+.188+.25G	16.7	17.6	789	1.8	5187	60
D&P/Seth+OC/D&P+Dala	.8/.2+.25G/1+2	16.7	16.1	725	1.6	4810	55
DP+En/DP+En+S+O	.5+.25/.5+.25+.2+.25G	18.0	15.6	582	1.4	5102	60
EPTC+Cycloate/Desmed&Phenmed 2X	*	17.3	20.3	656	1.5	6323	61
EPTC+Cycloate/Des&Phen+Endothall 2X	*	17.1	19.0	691	1.6	5861	54
EPTC+Cycl/De&Ph 2X/De&Ph+Dalapon	*	16.5	16.6	769	1.7	4840	56
EPTC+Cycl/Des&Phen/De&Ph+Sethoxy+OC	*	17.1	19.5	638	1.5	6051	54
EPTC+Cycl/D&P/D&P+Seth+OC/D&P+Etho	*	16.8	17.5	741	1.7	5215	66
EPTC+Cycl/Des&Phen/Des&Phen+Flua+OC	*	16.6	19.3	766	1.8	5677	54
EPTC+Cycl/De&Ph/Seth+OC/De&Ph+Dala	*	16.6	14.7	669	1.5	4388	47
EPTC+Cycl/D&P+Endo/D&P+Endo+Seth+OC	*	17.0	19.4	719	1.6	5881	51
Diethatyl/Desmed&Phenmed 2X	*	17.5	18.5	637	1.5	5856	57
Diethatyl/Des&Phen+Endothall 2X	*	17.0	20.8	700	1.6	6357	60
Diethatyl/De&Ph 2X/De&Ph+Dalapon	*	16.8	16.4	713	1.6	4922	55
Diethatyl/De&Ph/De&Ph+Sethoxydim+OC	*	17.3	20.1	638	1.5	6323	59
Diethatyl/D&P/D&P+Seth+OC/D&P+Etho	*	16.8	16.8	749	1.7	4978	58
Diethatyl/Des&Phen/Des&Phen+Flua+OC	*	16.1	21.3	814	1.8	6033	59
Diethatyl/De&Ph/Seth+OC/De&Ph+Dala	*	16.8	15.9	718	1.6	4757	50
Diethatyl/D&P+Endo/D&P+Endo+Seth+OC	*	16.8	19.3	721	1.7	5759	56
Ethofume/Desmed&Phenmed 2X	*	16.2	22.5	847	1.8	6365	57
Ethofume/Des&Phen+Endothall 2X	*	16.9	21.0	691	1.6	6362	58
Ethofume/De&Ph 2X/De&Ph+Dalapon	*	16.8	14.6	678	1.6	4412	54
Ethofume/De&Ph/De&Ph+Sethoxydim+OC	*	16.7	21.6	739	1.6	6389	60
Ethofume/D&P/D&P+Seth+OC/D&P+Etho	*	16.3	17.9	808	1.8	5155	54
Ethofume/Des&Phen/Des&Phen+Flua+OC	*	17.1	21.3	705	1.6	6493	55
Ethofume/De&Ph/Seth+OC/De&Ph+Dala	*	16.8	16.9	700	1.6	5073	51
Ethofume/D&P+Endo/D&P+Endo+Seth+OC	*	17.3	19.4	666	1.5	6061	53
Hand Weeded Check		16.8	22.2	705	1.6	6666	55
Mean		16.9	17.9	709	1.6	5409	56
High mean		18.0	22.5	847	1.8	6666	66
Low mean		16.1	10.6	582	1.4	3163	47
Coeff. of variation		4.7	12.3	19	15.4	13	11
LSD(1 Percent)		1.5	4.1	255	0.5	1307	12
LSD(5 Percent)		1.1	3.1	193	0.3	989	9
No. of reps		4.0	4.0	4	4.0	4	4

* Herbicide rates are the same when applied in combination or alone.

** OC = Hopkin's Agicide Activator

Summary

The hand weeded check yielded more extractable sucrose/A than any other treatment but 15 of the treatments were not significantly lower than the hand weeded check. The 15 similar treatments were the three soil applied treatments followed by the five postemergence treatments that included only two postemergence applications. Plots treated with postemergence herbicides alone or soil applied herbicides alone yielded less than the hand weeded check.

Soil applied herbicides plus postemergence herbicides, Hillsboro, 1985. Preplant incorporated and preemergence herbicides were applied May 9 when the air temp. = 85 F, wind was north at 5 - 10 mph, and the soil surface was dry, 1 - 2 inches was dry, and 3-4 inches was moist. Preplant incorporated herbicides were incorporated with a rototiller set four inches deep. Bush Johnson 19 sugarbeet was seeded 1.25 inches deep in 22 inch rows May 9. The first split application of all postemergence herbicide treatments was applied 9:45 am June 20 (mostly sunny, air temp.=74F, soil temp. at six inches=64F, wind=southeast 12mph, rel. hum.=47%, soil moisture on surface=dry, 1-2 inches=moist, 3-4 inches=wet) when sugarbeets had 4-6 leaves, wild mustard was 2-5 inches tall, common lambsquarters was cotyledon to 2.5 inches tall, redroot pigweed was cotyledon to 2 inches tall, and green and yellow foxtail was 0.5-3 inches tall. The second portion of all split applied postemergence treatments were applied 5:00 pm June 24 when the air temp.=72F, soil temp. at six inches=69F, and rel. hum.=57%. Treatments with three postemergence herbicide applications had the final portion applied 3:30 pm July 1 when the air temp.=80F, soil temp. at six inches=71F, rel. hum.=48%, and the wind was north at 9 mph. Sugarbeets had 8-12 leaves July 1 and most weeds had turned brown and stopped growing due to the two earlier herbicide treatments. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Wild mustard, common lambsquarters, redroot pigweed, green and yellow foxtail control and sugarbeet injury were evaluated July 15.

Treatment**	Rate (lb/A)	Sgbt inj ratg	Wimu cntl ratg	Gr&Ye Fxtl cntl ratg	Rrpw cntl ratg	Colq cntl ratg
		(%)				
EPTC+Cycloate (PPI)	2+2	0	0	92	63	51
Diethatyl (Pre)	6	0	0	40	83	8
Ethofumesate (Pre)	3.75	0	20	47	82	41
Desmedipham&Phenmedipham 2X	.5	0	93	58	48	89
Des&Phen+Endothall 2X	.5+.25	3	91	73	56	91
Des&Phen 2X/Des&Phen+Dalapon	.5/1+2	15	97	88	86	99
De&Ph/De&Ph+Sethoxy+OC	.5/.5+.2+.25G	0	90	92	56	95
DP/DP+Se+O/DP+Et	.5/.5+.2+.25G/.8+1.2	13	98	97	91	99
D&P/D&P+Fluazifop+OC	.5/.5+.188+.25G	0	83	93	49	97
D&P/Seth+OC/D&P+Dala	.8/.2+.25G/1+2	11	96	97	80	99
DP+En/DP+En+Se+O	.5+.25/.5+.25+.2+.25G	0	90	86	50	90
EPTC+Cycloate/Desmed&Phenmed 2X	*	0	97	98	97	99
EPTC+Cycloate/Des&Phen+Endothall 2X	*	0	96	99	79	99
EPTC+Cycl/De&Ph 2X/De&Ph+Dalapon	*	21	99	99	97	99
EPTC+Cycl/De&Ph/De&Ph+Sethoxydim+OC	*	0	96	99	97	99
EPTC+Cycl/D&P/D&P+Seth+OC/D&P+Etho	*	13	99	98	99	99
EPTC+Cycl/Des&Phen/Des&Phen+Flua+OC	*	0	95	99	93	97
EPTC+Cycl/De&Ph/Seth+OC/De&Ph+Dala	*	16	99	99	93	99
EPTC+Cycl/D&P+Endo/D&P+Endo+Seth+OC	*	0	95	99	91	99

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Soil applied herbicides plus postemergence herbicides. (continued)

Treatment*	Rate (lb/A)	Sgbt inj ratg	Wimu cntl ratg	Gr&Ye Fxtl cntl ratg	Rrpw cntl ratg	Colq cntl ratg
		(%)				
Diethatyl/Desmed&Phenmed 2X	*	0	97	81	72	93
Diethatyl/Des&Phen+Endothall 2X	*	5	94	80	76	92
Diethatyl/De&Ph 2X/De&Ph+Dalapon	*	25	99	94	97	99
Diethatyl/De&Ph/De&Ph+Sethoxydim+OC	*	0	96	95	84	96
Diethatyl/D&P/D&P+Seth+OC/D&P+Etho	*	23	99	98	97	99
Diethatyl/Des&Phen/Des&Phen+Flua+OC	*	0	97	93	95	97
Diethatyl/De&Ph/Seth+OC/De&Ph+Dala	*	24	97	99	96	98
Diethatyl/D&P+Endo/D&P+Endo+Seth+OC	*	0	97	92	75	86
Ethofume/Desmed&Phenmed 2X	*	0	95	97	87	99
Ethofume/Des&Phen+Endothall 2X	*	0	98	89	93	99
Ethofume/De&Ph 2X/De&Ph+Dalapon	*	23	99	92	97	99
Ethofume/De&Ph/De&Ph+Sethoxydim+OC	*	0	98	94	97	99
Ethofume/D&P/D&P+Seth+OC/D&P+Etho	*	11	99	98	99	99
Ethofume/Des&Phen/Des&Phen+Flua+OC	*	0	98	96	92	99
Ethofume/De&Ph/Seth+OC/De&Ph+Dala	*	18	99	99	98	99
Ethofume/D&P+Endo/D&P+Endo+Seth+OC	*	0	97	93	90	98
Mean		6	88	90	84	91
High mean		25	99	99	99	99
Low mean		0	0	40	48	8
Coeff. of variation		79	4	7	12	7
LSD(1 Percent)		9	7	12	19	13
LSD(5 Percent)		7	6	9	14	10
No. of reps		4	4	4	4	4

* Rates for soil applied and postemergence herbicides are the same when applied in combination or alone.
** OC = Hopkin`s Agicide Activator

Summary

All treatments which caused significant sugarbeet injury included desmedipham&phenmedipham + dalapon or desmedipham&phenmedipham + ethofumesate. EPTC+cycloate gave better control of green and yellow foxtail but less control of redroot pigweed than ethofumesate and diethatyl. Postemergence treatments over top of PPI or Preemergence treatments generally gave better control of green and yellow foxtail and redroot pigweed than postemergence herbicides alone or soil applied herbicides alone. Desmedipham&phenmedipham/desmed&phenmed+sethoxydim+OC/desmed&phenmed+ethofumesate, three applications postemergence, over top of the soil applied treatments gave 97% or greater control of all weed species.

Postemergence herbicides, Argyle, 1985. Beta 1230 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 29. Preemergence herbicides were applied after planting when the air temp.=78F, soil temp. at six inches=54F, wind was south at 12 mph, soil surface was dry, moist at 1-2 inches, and wet at 3-4 inches. The first half of split applied postemergence herbicide treatments were applied 6:00 pm June 19 (air temp.=74F, soil temp. at six inches=65F, rel.hum.=40%, soil surface was dry, 1-2 inches was wet, 3-4 inches was wet) when sugarbeets had 4 to 8 leaves, Pennsylvania smartweed was 1-2.5 inches tall, redroot pigweed was 0.5-1 inch tall, green foxtail was 0.5-3 inches tall, and wild oats was 2-4 inches tall. The second half of split applied treatments and all single application treatments were applied 11:45 am June 25 (air temp.=75F, soil temp. at six inches=62F, rel. hum.=82%, wind= southeast 18 mph, soil surface was dry, 1-2 inches was wet, 3-4 inches was wet) when sugarbeets had 6-8 leaves, Pennsylvania smartweed was 2-3 in. tall, redroot pigweed was 1-2 inches tall, green foxtail was 1-4 inches tall, and wild oats was 3-6 inches tall. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Redroot pigweed, green foxtail, Pennsylvania smartweed, and wild oats control and sugarbeet injury were evaluated July 8.

Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Pesw cntl ratg	Wioa cntl ratg	Grft cntl ratg
		(%)				
Metamitron 2X	2	0	20	40	0	0
Des&Phen+Metamitron 2x	.5+2	3	74	75	40	45
Desmedipham&Phenmedipham 2X	.5	3	58	49	40	50
Desmedipham&Phenmedipham	2	8	75	63	35	64
Des&Phen+Herbex	2+.25G	4	83	76	33	60
Des&Phen+Endothall 2X	.5+.25	0	60	88	35	45
Des&Phen+Dalapon 2X	.5+1	5	73	80	48	93
Des&Phen+Ethofumesate 2X	.4+.75	6	84	86	58	74
De&Ph/De&Ph+Sethoxy+OC	.5/.5+.2+.25G	0	65	64	90	99
Desm/Desm+Sethox+OC	.5/.5+.2+.25G	0	95	43	89	99
D&P/D&P+Fluazifop+OC	.5/.5+.188+.25G	0	73	63	94	99
Benazolin	.25	21	14	15	8	13
Sethoxydim+OC	.2+.25G	0	0	0	98	99
Fluazifop+OC	.188+.25G	0	0	0	99	99
Des&Phen/Des&Phen+Dalapon	.5/.5+1	3	73	64	43	85
Ethofumesate (Pre)	3.75	0	46	63	8	73
Diethatyl (Pre)	6	0	13	13	0	15
Eth/D&P/D&P+Seth+O	3.75/.5/.5+.2+.25G	0	93	86	92	99
Diet/D&P/D&P+Seth+OC	6/.5/.5+.2+.25G	3	88	79	95	99

Table continued on next page.

Postemergencce herbicides, Argyle. (continued)

Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Pesw cntl ratg	Wioa cntl ratg	Grft cntl ratg
		-------	-------	(%)	-------	-------
Mean		3	57	55	53	69
High mean		21	95	88	99	99
Low mean		0	0	0	0	0
Coeff. of variation		154	18	23	17	18
LSD(1 Percent)		8	20	24	17	24
LSD(5 Percent)		6	15	18	12	18
No. of reps		4	4	4	4	4

* OC = Hopkin`s Agicide Activator

Summary

Metamitron gave poor control of redroot pigweed and Pennsylvania smartweed but split applied desmedipham&phenmedipham+metamitron gave better control of redroot pigweed and P. smartweed than split applied desmedipham&phenmedipham. Split applied desmedipham&phenmedipham+endothall gave better control of P. smartweed than split applied desmedipham&phenmedipham. Split applied desmedipham&phenmedipham+dalapon and desmedipham&phenmedipham+ethofumesate gave better control of redroot pigweed, P. smartweed, and green foxtail than split applied desmedipham&phenmedipham. Sethoxydim and fluazifop gave excellent control of wild oats and green foxtail. Benazolin gave more sugarbeet injury than any other treatment. Desmedipham/desmedipham+sethoxydim+OC gave better control of redroot pigweed and less control of P. smartweed than desmedipham&phenmedipham/desmedipham&phenmedipham+sethoxydim+OC. Preemergence ethofumesate or diethatyl followed by postemergence herbicides gave better weed control than post herbicides alone or preemergence herbicides alone.

Postemergence herbicides, Clara City, 1985. Preplant incorporated herbicides were applied and rototiller incorporated four inches deep May 6 when the air temp.=74F and wind was west at 15 mph. Preemergence herbicides were applied May 6 and Beta 1132 sugarbeet was seeded 1.25 in. deep in 22 in. rows May 7. The first half of split application postemergence herbicide treatments were applied 1:00pm June 5 (air temp.=75F, soil temp. at six inches=65F, wind=north at 0-2 mph, rel. hum.=34%, soil surface was dry, 1-2 inches was moist, 3-4 inches was moist) when sugarbeets had 4 leaves, common lambsquarters had 2-6 leaves (1 inch tall), green and yellow foxtail was 0.5-3 inches tall, and buffalo bur had 2-4 leaves. The second half of split application treatments and all single application treatments were applied 1:00 pm June 13 (air temp.= 73F, soil temp. at six inches=65F, wind= south 7 mph, rel. hum.=36%, soil surface was dry, 1-2 inches was moist, 3-4 inches was wet) when sugarbeets had 6-8 leaves, green and yellow foxtail was 1-6 inches tall, common lambsquarters was 1-3 inches tall, and buffalo bur had a leaf span of 2-4 inches. All herbicides were applied in 17 gpa water at 40psi to the center four rows of six row plots. Common lambsquarters, buffalo bur, and foxtail control and sugarbeet injury were evaluated June 25.

Treatment*	Rate (lb/A)	Sugarbeet injury rating	Gr & Ye Foxtail control rating	Common Lmbsqrtrs control rating	Buffalo Bur control rating
		(%)			
Sethoxydim+OC	.2+.25G	0	99	0	0
Fluazifop+OC	.188+.25G	0	99	0	0
DPX-Y6202+OC	.1+.25G	0	99	0	0
Endothall+Sethoxydim+OC	.5+.2+.25G	8	99	0	0
Endothall+Fluazifop+OC	.5+.188+.25G	9	96	5	3
Endothall+DPX-Y6202+OC	.5+.1+.25G	10	98	0	0
Endothall+Dalapon	.5+2	13	66	0	0
Benazolin	.25	24	0	39	64
D+En/D+En+Se+OC	.5+.25/.5+.25+.2+.25G	11	98	97	97
Desm/Desm+Sethoxydim+OC	.5/.5+.2+.25G	10	99	99	99
De&Ph/De&Ph+Sethoxy+OC	.5/.5+.2+.25G	13	99	99	99
Des/Des+Fluazifop+OC	.5/.5+.188+.25G	18	92	99	99
Ethofumesate (Pre)	3.75	0	77	66	34
Diethatyl (Pre)	6	11	88	19	79
Eth/De/De+Seth+OC	3.75/.5/.5+.2+.25G	10	99	99	99
Diet/Des/Des+Seth+OC	6/.5/.5+.2+.25G	19	99	99	99
Des/Des+DPX-Y6202+OC	.5/.5+.1+.25G	5	95	98	99
EPTC+Cyc(PPI)/Diet(Pre)/De/De+Seth+OC	2+2/4/.5/.5+.2+.25G	29	99	99	99

Table continued on next page.

Postemergence herbicides, Clara City. (continued)

Treatment*	Rate (lb/A)	Sugarbeet injury rating	Gr & Ye Foxtail control rating	Common Lmbsqrtrs control rating	Buffalo Bur control rating
		----------------	(%)	----------------	
Mean		10	89	51	54
High mean		29	99	99	99
Low mean		0	0	0	0
Coeff. of variation		78	5	14	11
LSD(1 Percent)		15	8	13	11
LSD(5 Percent)		11	6	10	9
No. of reps		4	4	4	4

* OC = Hopkin`s Agicide Activator

Summary

Benazolin and EPTC+cycloate (PPI) + diethatyl (Pre) + desmedipham/desmedipham+sethoxydim+OC (Post) gave over 20% sugarbeet injury. Sethoxydim+OC alone or in combination with endothall or desmedipham gave nearly total control of green and yellow foxtail. Diethatyl gave better control of foxtail spp and buffalo bur and less control of common lambsquarters than ethofumesate. All treatments including desmedipham gave excellent control of common lambsquarter and buffalo bur.

Postemergence herbicides, Colfax, 1985. Bush Johnson 19 sugarbeet was seeded 1.25 inches deep in 22 inch rows May 7. Preemergence herbicide treatments were applied after planting on May 7 when the air temp.=71F, soil temp. at six inches = 56 F, wind = northeast at 3 - 5 mph, soil surface was dry, 1-2 inches was moist, and 3-4 inches was moist. The first half of split applied postemergence herbicide treatments was applied 6:00 pm June 5 (air temp.=70F, soil temp. at six inches=65F, rel. hum.=48%, wind=0 mph, soil surface was moist, 1-2 inches was wet, 3-4 inches was wet) when sugarbeets had 4 leaves, redroot pigweed had 2-4 leaves (0.5-1.5 inches tall), and foxtail barley was 0.5-2 inches tall. The second half of split applied treatments and all single application postemergence treatments were applied 11:00am June 14 (air temp.=63F, soil temp. at six inches=62F, rel. hum.=89%, wind=0 mph, soil surface was moist, 1-2 inches was wet, 3-4 inches was wet) when sugarbeets had 6-8 leaves, redroot pigweed was 1-2 inches tall, and foxtail barley was 2-4 inches tall. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Redroot pigweed and foxtail barley control and sugarbeet injury were evaluated June 22.

Treatment*	Rate (lb/A)	Sugarbeet injury rating	Redroot Pigweed control rating	Foxtail Barley control rating
			(%)	
Metamitron 2X	2	0	89	1
Des&Phen+Metamitron 2x	.5+2	6	99	89
Desmedipham&Phenmedipham 2X	.5	3	91	78
Desmedipham&Phenmedipham	2	4	80	70
Des&Phen+Herbex	2+.25G	13	89	59
Des&Phen+Endothall 2X	.5+.25	8	81	73
Des&Phen+Dalapon 2X	.5+1	6	81	89
Des&Phen+Ethofumesate 2X	.4+.75	9	99	78
De&Ph/De&Ph+Sethoxy+OC	.5/.5+.2+.25G	15	89	99
Desm/Desm+Sethox+OC	.5/.5+.2+.25G	8	98	99
D&P/D&P+Fluazifop+OC	.5/.5+.188+.25G	14	87	99
Benazolin	.25	9	46	0
Sethoxydim+OC	.2+.25G	0	0	98
Fluazifop+OC	.188+.25G	0	0	99
Des&Phen/Des&Phen+Dalapon	.5/.5+1	6	89	59
Ethofumesate (Pre)	3.75	7	99	99
Diethatyl (Pre)	6	3	97	99
Eth/D&P/D&P+Seth+O	3.75/.5/.5+.2+.25G	13	99	99
Diet/D&P/D&P+Seth+OC	6/.5/.5+.2+.25G	24	99	99

Table continued on next page.

Postemergence herbicides, Colfax. (continued)

Treatment*	Rate (lb/A)	Sugarbeet injury rating	Redroot Pigweed control rating	Foxtail Barley control rating
		-------------	(%)	-------------
Mean		8	80	78
High mean		24	99	99
Low mean		0	0	0
Coeff. of variation		88	11	8
LSD(1 Percent)		13	17	12
LSD(5 Percent)		9	13	9
No. of reps		4	4	4

* OC = Hopkin`s Agicide Activator

Summary

Desmedipham&phenmedipham+Herbex gave more sugarbeet injury and less control of foxtail barley than desmedipham&phenmedipham alone. Desmedipham&Phenmedipham followed by desmedipham&phenmedipham+sethoxydim+OC or desmedipham&phenmedipham+fluazifop+OC gave more sugarbeet injury than the split application of desmedipham&phenmedipham. The oil concentrate (OC) caused increased injury from the desmedipham&phenmedipham. Sethoxydim and fluazifop gave excellent control of foxtail barley. Preemergence ethofumesate and diethatyl gave excellent control of redroot pigweed and foxtail barley. Preemergence diethatyl followed by postemergence desmedipham&phenmedipham/desmedipham&phenmedipham+sethoxydim+OC gave more sugarbeet injury than any other treatment.

Postemergence grass herbicides, Crookston, 1985. Beta 1230 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 24. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. The first half of split applied treatments was applied 10:30am May 28 when the air temp. was 64F, soil temp. at 6 inches was 65F, sky was cloudy, wind was southwest at 12 mph, relative humidity was 52%, soil was dry on the surface, moist at 1-2 inches, wet at 3-4 inches, sugarbeets were in the 4-6 leaf stage, redroot pigweed was cotyledon to 6 leaf (1.5 inches tall), green foxtail was 1-3 inches tall, kochia was cotyledon to 1.5 inches tall, and wild mustard was in the 2-6 leaf stage. All single application treatments and the second half of split application treatments were applied 11:00am June 3 when the air temp. was 61F, soil temp. at six inches was 54F, wind was southeast at 8 mph, sky was sunny, relative humidity was 56%, soil was dry on the surface, moist at 1-4 inches, sugarbeets were in the 6 leaf stage, redroot pigweed was 2 leaf to 1.5 inches tall, green foxtail was 1-3 inches tall, wild mustard was 4-8 leaf, and kochia was 1-3 inches tall. Redroot pigweed, kochia, green foxtail, and wild mustard control and sugarbeet injury were evaluated July 11.

Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Kochia cntl ratg	GrFxtl cntl ratg	Wimu cntl ratg
		(%)				
Fluazifop+OC	.125+.25G	0	0	0	86	0
Fluazifop+OC	.188+.25G	0	0	0	90	0
DPX-Y6202+OC	.05+.25G	0	0	0	80	0
DPX-Y6202+OC	.1+.25G	0	0	0	95	0
Haloxyfop+OC	.05+.25G	0	0	0	81	0
Haloxyfop+OC	.1+.25G	0	0	0	90	0
BAS-51702+OC	.05+.25G	0	0	0	96	0
BAS-51702+OC	.1+.25G	0	0	0	98	0
FMC-57020	.5	19	38	94	33	26
FMC-57020	1	40	45	93	63	50
Fenoxaprop+OC	.1+.25G	0	0	0	95	0
Fenoxaprop+OC	.2+.25G	0	0	0	97	0
D&P/D&P+Fluazifop+OC	.5/.5+.188+.25G	0	94	88	89	99
D&P/D&P+DPX-Y6202+OC	.5/.5+.1+.25G	0	94	91	88	99
D&P/D&P+Haloxyfop+OC	.5/.5+.1+.25G	0	94	94	92	99
D&P/D&P+BAS-51702+OC	.5/.5+.1+.25G	0	95	94	94	99
D&P/D&P+Fenoxaprop+OC	.5/.5+.2+.25G	0	93	93	92	99
D&P/D&P+Fenoxaprop	.5/.5+.2	0	91	91	93	99
Mean		3	36	41	86	37
High mean		40	95	94	98	99
Low mean		0	0	0	33	0
Coeff. of variation		35	14	5	7	11
LSD(1 Percent)		2	9	4	11	8
LSD(5 Percent)		2	7	3	8	6
No. of reps		4	4	4	4	4

* OC = Hopkin's Agicide Activator

Summary

Desmedipham+phenmedipham split applied at 0.25+0.25 lb/A for each application and combined with a grass control herbicide for the second application gave good to excellent control of redroot pigweed, kochia, wild mustard, and green foxtail with no sugarbeet injury. Green foxtail control was not significantly reduced by the desmedipham+phenmedipham combination compared to the grass herbicides alone. BAS-51702 at 0.05 lb/A gave better green foxtail control than haloxyfop of DPX-Y6202 at 0.05 lb/A and better than fluazifop at 0.125 lb/A. Fenoxaprop without oil concentrate in combination with desmedipham plus phenmedipham gave green foxtail control similar to the same treatment with oil concentrate added.

Wild oats control with postemergence grass herbicides, Fargo, 1985. Bush Johnson 19 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 26. Stage one treatments were applied 11:30 am May 20(air temp.=61F, soil temp. at six inches=61F, wind=north 10 mph, rel. hum.=50%, soil surface was dry, 1-2 inches was moist, 3-4 inches was wet) when wild oats had 2-3 leaves (4 inches tall) and wild mustard was in the cotyledon to 2 leaf stage. Stage two treatments were applied 7:00pm June 3 (air temp.=55F, soil temp. at six inches=58F, wind=south 7 mph, rel. hum.=71%, soil surface was dry, 1-2 inches was moist, 3-4 inches was wet) when wild oats was 7-11 inches tall and wild mustard had 4-8 leaves. Herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Wild oats and wild mustard control were evaluated July 2.

		--- June 21 ---		---- July 2 ----	
Treatment*	Rate (lb/A)	Wioa control rating	Wimu control rating	Wioa control rating	Wimu control rating
		(%)			
Fluazifop+OC Stage1	.125+.25G	94	0	93	0
Fluazifop+OC Stage1	.188+.25G	96	0	95	0
Fluazifop+OC Stage1	.25+.25G	96	0	92	0
BAS-51702+OC Stage1	.05+.25G	92	0	89	0
BAS-51702+OC Stage1	.075+.25G	96	0	95	0
BAS-51702+OC Stage1	.1+.25G	97	0	98	0
BAS-51702+OC Stage1	.15+.25G	99	0	99	0
Fenoxaprop+OC Stage1	.15+.25G	89	0	79	0
Fenoxaprop+OC Stage1	.2+.25G	90	0	89	0
Clopropoxydim+OC Stage1	.1+.25G	94	0	93	0
Clopropoxydim+OC Stage1	.2+.25G	98	0	98	0
Sethoxydim+OC Stage1	.2+.25G	87	0	80	0
Sethoxydim+OC Stage1	.3+.25G	95	0	95	0
DPX-Y6202+OC Stage1	.05+.25G	76	0	75	0
DPX-Y6202+OC Stage1	.1+.25G	95	0	90	0
DPX-Y6202+OC Stage1	.125+.25G	96	0	96	0
Haloxyfop+OC Stage1	.05+.25G	78	0	75	0
Haloxyfop+OC Stage1	.1+.25G	95	0	93	0
Haloxyfop+OC Stage1	.125+.25G	96	0	96	0
SC-1084+OC Stage1	.25+.25G	61	0	65	0
SC-1084+OC Stage1	.5+.25G	95	0	91	0
Seth+Des&Phen+OC Stage1	.2+1+.25G	66	99	43	97
Flua+Des&Phen+OC Stage1	.188+1+.25G	82	99	60	95
Clopr+Des&Phen+OC Stage1	.1+1+.25G	80	99	53	96
DPX-Y6202+De&Ph+OC Stage1	.05+1+.25G	50	99	24	98
DPX-Y6202+De&Ph+OC Stage1	.1+1+.25G	74	99	63	97
DPX-Y6202+De&Ph+OC Stage1	.125+1+.25G	74	99	50	97
BAS51702+De&Ph+OC Stage1	.05+1+.25G	80	99	54	96
BAS51702+De&Ph+OC Stage1	.1+1+.25G	92	99	81	92
Fenox+Des&Phen+OC Stage1	.15+1+.25G	54	99	34	98
Fenoxaprop+Des&Phen Stage1	.15+1	27	99	24	99
Halox+Des&Phen+OC Stage1	.05+1+.25G	68	99	43	97
Halox+Des&Phen+OC Stage1	.1+1+.25G	92	99	78	95
SC-1084+Des&Phen+OC Stage1	.25+1+.25G	46	99	28	99

Table continued on next page.

Treatment*	Rate (lb/A)	--- June 21 --- Wioa control rating	Wimu control rating	---- July 2 ---- Wioa control rating	Wimu control rating
		----------------	(%)	----------------	
Fluazifop+OC Stage2	.188+.25G	99	0	99	0
BAS-51702+OC Stage2	.075+.25G	99	0	99	0
BAS-51702+OC Stage2	.1+.25G	99	0	99	0
Fenoxaprop+OC Stage2	.15+.25G	96	0	95	0
Clopropoxydim+OC Stage2	.1+.25G	99	0	98	0
Sethoxydim+OC Stage2	.2+.25G	99	0	98	0
DPX-Y6202+OC Stage2	.05+.25G	97	0	94	0
DPX-Y6202+OC Stage2	.1+.25G	98	0	97	0
Haloxyfop+OC Stage2	.05+.25G	99	0	99	0
Haloxyfop+OC Stage2	.1+.25G	99	0	99	0
SC-1084+OC Stage2	.25+.25G	96	0	91	0
Mean		86	29	79	28
High mean		99	99	99	99
Low mean		27	0	24	0
Coeff. of variation		7	1	11	4
LSD(1 Percent)		11	0	15	2
LSD(5 Percent)		8	0	12	1
No. of reps		4	4	4	4

* OC = Hopkin`s Agicide Activator

Summary

Wild oats control was evaluated similarly on June 21 and July 2 for grass control herbicides used alone. However, wild oats control was less on July 2 than on June 21 for grass herbicides combined with desmedipham&phenmedipham. Wild oats partially recovered from the initial injury. Combining desmedipham& phenmedipham with the grass herbicides reduced wild oats control compared to grass herbicides used alone. Desmedipham&phenmedipham gave excellent wild mustard control. Grass herbicides gave better control of 7-11 inch wild oats than of 2-3 leaf wild oats. The lesser control with the early application may have been due to wild oats emergence after application.

Substitution of dalapon for desmedipham and phenmedipham, Glyndon, 1985. ACH M-403 was seeded in rows 1, 2, and 3 and ACH 164 in rows 4, 5, and 6 on May 3. Sugarbeet was seeded 1.25 inches deep in 22 inch rows. The first half of split application herbicide treatments were applied 11:00 am June 4 (mostly sunny, air temp.=62F, soil temp. at six inches=62F, rel.hum.=46%, wind was west 7 mph, soil surface was dry, 1-2 in. was moist, 3-4 in. was wet) when sugarbeets had 4 leaves, redroot pigweed had 2-4 leaves (1 in. tall), green foxtail was 0.5-2.5 inches tall, and common lambsquarters had 2-6 leaves(2 in. tall). All single application treatments and the second half of split applied treatments were applied 4:30 pm June 10 (air temp.=64F, soil temp. at 6 inches was 62F, wind=southwest 5 mph, rel. hum.=65%, soil surface was dry, 1-2 inches was moist, 3-4 in. was wet) when sugarbeets had 6 leaves, redroot pigweed was cotyledon to 1.5 inches tall, green foxtail was 1-4 inches tall, and common lambsquarters was cotyledon to 2 inches tall. All treatments were applied a second time due to poor weed control from first applications. Single application treatments and the first half of split applied treatments were applied again 5:00 am June 26 (air temp.=58F, soil temp. at six inches=60F, wind=north at 5 mph, rel. hum.=83%, soil surface was moist, 1-2 inches was wet, and 3-4 inches was wet) when sugarbeets had 6-10 leaves, redroot pigweed was 2 leaf to 3 inches tall, green foxtail was 3 - 5 inches tall, and common lambsquarters was 2 leaf to 4 inches tall. The second half of split applied treatments were applied 11:30 am July 2 when the air temp.=79F, soil temp. at six inches=64F, rel. hum.=61%, wind=north at 3 mph, soil surface was dry, 1 - 2 inches was moist, and 3-4 inches was wet. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Redroot pigweed control and sugarbeet injury were evaluated June 22. Green foxtail and common lambsquarters control were evaluated August 2.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Redroot Pigweed control rating	Common Lmbsquarts control rating	Green Foxtail control rating
		(%)			
Desmedipham	.125	0	0	0	0
Desmedipham	.25	0	0	6	0
Desmedipham	.33	0	0	41	10
Desmedipham	.5	0	0	48	21
Desmedipham	.75	0	8	59	33
Desmedipham	1.0	0	0	81	39
Desmedipham&Phenmedipham	.25	0	0	31	25
Desmedipham&Phenmedipham	.33	0	0	40	24
Desmedipham&Phenmedipham	.50	0	0	73	63
Desmedipham&Phenmedipham	.75	0	0	87	71
Dalapon	.5	0	0	0	63
Dalapon	1	0	0	0	90
Desmedipham 2X	.125	0	10	30	10
Desmedipham 2X	.25	0	45	75	25
Desmedipham 2X	.33	0	78	86	41
Desmedipham 2X	.5	0	85	95	65
Desmedipham+Dalapon	.125+.5	0	6	6	70
Desmedipham+Dalapon	.25+.5	0	0	26	80
Desmedipham+Dalapon	.33+.5	0	5	41	84
Desmedipham+Dalapon	.5+.5	0	0	68	95
Desmedipham+Dalapon	.75+.5	0	0	71	84
Desmedipham+Dalapon	1+.5	0	13	78	91

Table continued on next page.

Substitution of dalapon for desmedipham and phenmedipham. (continued)

Treatment	Rate (lb/A)	Sugarbeet injury rating	Redroot Pigweed control rating	Common Lmbsquarts control rating	Green Foxtail control rating
		------------------	(%)	------------------	
Desmedipham+Dalapon	.125+1	0	0	18	95
Desmedipham+Dalapon	.25+1	0	0	48	88
Desmedipham+Dalapon	.33+1	0	5	40	92
Desmedipham+Dalapon	.5+1	0	8	68	93
Desmedipham+Dalapon	.75+1	0	13	72	90
Desmedipham+Dalapon	1+1	0	8	89	85
Desmed&Phenmed+Dalapon	.25+.5	0	0	43	77
Desmed&Phenmed+Dalapon	.33+.5	0	0	50	70
Desmed&Phenmed+Dalapon	.50+.5	0	0	78	85
Desmed&Phenmed+Dalapon	.75+.5	0	0	82	81
Desmed&Phenmed+Dalapon	.25+1	0	0	66	89
Desmed&Phenmed+Dalapon	.33+1	0	0	66	91
Desmed&Phenmed+Dalapon	.5+1	0	0	63	91
Desmed&Phenmed+Dalapon	.75+1	0	5	85	94
Desmedipham+Dalapon 2X	.125+.5	0	28	69	93
Desmedipham+Dalapon 2X	.25+.5	0	59	89	94
Desmedipham+Dalapon 2X	.33+.5	0	80	96	97
Desmedipham+Dalapon 2X	.5+.5	0	93	99	99
Desmedipham+Dalapon 2X	.125+1	0	16	71	95
Desmedipham+Dalapon 2X	.25+1	0	79	92	99
Desmedipham+Dalapon 2X	.33+1	0	85	99	98
Desmedipham+Dalapon 2X	.5+1	0	91	99	99
Mean		0	19	60	70
High mean		0	93	99	99
Low mean		0	0	0	0
Coeff. of variation		0	52	24	21
LSD(1 Percent)		0	17	26	27
LSD(5 Percent)		0	13	20	20
No. of reps		4	4	4	4

Summary

All treatments in the Table were applied twice. Weed control and sugarbeet injury were much lower than normal with both applications. Redroot pigweed control and sugarbeet injury were evaluated after the first application while common lambsquarters and green foxtail control were evaluated after the second application. Desmedipham+dalapon and desmedipham&phenmedipham+dalapon gave or tended to give greater control of common lambsquarters and green foxtail than desmedipham or desmedipham&phenmedipham. Combinations with dalapon at 1 lb/A tended to give greater weed control than combinations with 0.5 lb/A.

Substitution of dalapon and ethofumesate for desmedipham, St. Thomas, 1985. Hilleshog Monoricca sugarbeet was seeded 1.25 inches deep in 22 inch rows May 9. Single application treatments and the first half of split applied treatments were applied 9:00 am July 3 when the air temp. was 76F, soil temp. was 69F, rel. hum. was 67%, wind was north at 5 mph, soil moisture on the surface was dry and wet below the surface, sugarbeets were in the 4-8 leaf stage, green foxtail was 4-6 inches tall, and wild buckwheat was 2-4 inches tall. The second half of split applied treatments was applied 11:30 am July 11 when the air temp. was 80F, soil temp. at six inches was 70F, wind was from the southwest at 8 mph, relative humidity was 38%, soil was dry on the surface, dry at 1-2 inches, moist at 3-4 inches, sugarbeets were 6-8 leaf, green foxtail was 8-12 inches tall, and wild buckwheat was 3-5 inches tall. Green foxtail and wild buckwheat control and sugarbeet injury were evaluated July 26.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Green Foxtail control rating	Wild Buckwheat control rating
		----------	(%)	----------
Desmedipham	.5	0	5	0
Desmedipham	1	0	3	16
Desmedipham 2X	.33	0	3	6
Desmedipham 2X	.5	0	10	23
Desmedipham+Dalapon	.5+.5	0	13	23
Desmedipham+Dalapon	1+.5	16	45	38
Desmedipham+Dalapon	.5+1	18	63	34
Desmedipham+Dalapon	1+1	15	46	43
Desmedipham+Dalapon	.5+2	29	93	54
Desmedipham+Dalapon	1+2	30	85	45
Desmedipham+Dalapon 2X	.33+.5	28	58	34
Desmedipham+Dalapon 2X	.5+.5	28	65	53
Desmedipham+Dalapon 2X	.33+1	26	90	55
Desmedipham+Dalapon 2X	.5+1	29	89	56
Desmedipham+Ethofumesate	.75+1.5	23	34	70
Desmedipham+Ethofumesate	.75+.75	13	11	63
Desmedipham+Ethofumesate	.75+.375	13	8	50
Desmedipham+Ethofumesate 2X	.4+.75	15	41	83
Desmedipham+Ethofumesate 2X	.4+.38	15	31	79
Desmedipham+Ethofumesate 2X	.4+.2	18	33	56
Mean		16	41	44
High mean		30	93	83
Low mean		0	3	0
Coeff. of variation		55	21	29
LSD(1 Percent)		16	16	24
LSD(5 Percent)		12	12	18
No. of reps		4	4	4

Summary

Desmedipham+ethofumesate split applied at 0.4+0.75 or 0.4+0.38 lb/A gave better control of wild buckwheat and less sugarbeet injury than split applications of desmedipham+dalapon. Desmedipham+dalapon and desmedipham+ethofumesate gave better weed control and more sugarbeet injury than desmedipham.

Influence of dalapon on other grass herbicides, Crookston, 1985. Beta 1230 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 24. Day one (D1) treatments were applied 10:30 am May 28 (cloudy sky, air temp.=64F, soil temp. at six inches=65F, rel. hum.=52%, wind=southeast at 12 mph, soil surface was dry, 1-2 inches was moist, 3-4 inches was wet) when sugarbeets had four leaves, green foxtail was 1-3 inches tall, and quackgrass was 4-8 inches tall. Day one plus two weeks (D1+2wks) treatments were applied 11:00am June 7 (sunny sky, air temp.=78F, soil temp. at six inches=62F, rel. hum.=43%, wind= west at 12 mph) when sugarbeets had 6 leaves, green foxtail was 1-4 inches tall, and quackgrass was 6-12 inches tall. All treatments were applied in 17 gpa water at 40 psi to the center four rows of six row plots. Green foxtail and quackgrass control and sugarbeet injury were evaluated July 11.

Treatment*	Rate (lb/A)	Sugarbeet injury rating	Green Foxtail control rating	Quackgrass control rating
		----------------(%)--------------		
Dalapon (D1)	1	0	76	0
Dalapon (D1)	2	0	99	50
Sethoxydim+OC (D1+2 weeks)	.2+.25G	0	99	68
Fluazifop+OC (D1+2 weeks)	.188+.25G	0	99	95
Dala (D1)/Seth+OC (D1+2wks)	1/.2+.25G	0	98	58
Dala (D1)/Seth+OC (D1+2wks)	2/.2+.25G	0	99	92
Dala(D1)/Flua+OC(D1+2wks)	1/.188+.25G	0	99	99
Dala(D1)/Flua+OC(D1+2wks)	2/.188+.25G	0	99	85
Mean		0	96	68
High mean		0	99	99
Low mean		0	76	0
Coeff. of variation		0	6	18
LSD(1 Percent)		0	12	42
LSD(5 Percent)		0	9	28
No. of reps		4	4	2

* OC = Hopkin`s Agicide Activator

Summary

Application of dalapon two weeks prior to sethoxydim or fluazifop did not reduce green foxtail or quackgrass control from sethoxydim or fluazifop.

Desmedipham plus additives, Hillsboro, 1985. Bush Johnson 19 sugarbeet was seeded 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 6:15 pm June 24 when the air temp. was 72F, soil temp. at six inches was 69F, rel. hum. was 57%, wind was southeast at 10 mph, soil was dry on the surface, wet at 1-4 inches, sugarbeets were in the 6-10 leaf stage, wild mustard was 4-18 inches tall, green and yellow foxtail was 2-6 inches tall, common lambsquarter was 2-8 inches tall, and redroot pigweed was 1-3 inches tall. Wild mustard, green and yellow foxtail, common lambsquarters, and redroot pigweed control and sugarbeet injury were evaluated July 15.

Treatment	Rate (lb/A)	Sgbt inj ratg	Wimu cntl ratg	Gr&Yel Fxtl cntl ratg (%)	Rrpw cntl ratg	Colq cntl ratg
Desmedipham+ATPlus 411F	1+.25G	0	73	33	40	71
Desmedipham+ATplus 411F	2+.25G	0	86	39	60	88
Desm+Soybean (once refined)*	1+.25G	0	59	15	38	51
Desm+Soybean (once refined)*	2+.25G	0	84	45	58	84
Desm+Soybean (methyl ester)*	1+.25G	0	65	23	38	58
Desm+Soybean (methyl ester)*	2+.25G	0	88	43	50	78
Desmedipham+Herbex	1+.25G	0	66	26	45	65
Desmedipham+Herbex	2+.25G	0	74	28	44	65
Desmedipham	1	0	68	20	38	54
Desmedipham	2	0	79	36	56	71
Desmedipham+Agra SC	1+.25G	0	59	20	36	49
Desmedipham+Agra SC	2+.25G	0	75	34	54	80
Desm+Sunflower(once refined)*	1+.25G	0	74	29	39	63
Desm+Sunflower(once refined)*	2+.25G	0	88	41	55	74
Desm+Sunflower(methyl ester)*	1+.25G	0	64	23	41	64
Desm+Sunflower(methyl ester)*	2+.25G	0	81	39	55	73
Desmedipham+Cycloate	1+2	0	71	33	44	69
Desmedipham+Cycloate	1+1	0	64	33	31	66
Mean		0	73	31	46	68
High mean		0	88	45	60	88
Low mean		0	59	15	31	49
Coeff. of variation		0	16	40	19	16
LSD(1 Percent)		0	21	23	16	21
LSD(5 Percent)		0	16	17	12	16
No. of reps		4	4	4	4	4

* ATPlus 300F emulsifier combined with additive at 17%.

Summary

Desmedipham+ATPlus 411F gave better control of common lambsquarters than desmedipham alone. None of the other additives had a significant effect on weed control from desmedipham.

Desmedipham plus additives, St. Thomas, 1985. Hilleshog Monoricca sugarbeet was seeded 1.25 inches deep in 22 inch rows May 9. Treatments were applied in 17 gpa water at 40psi to the center four rows of six row plots 3:00 pm June 19 (air temp.=80F, soil temp. at six inches=71F, rel. hum.=32%, sunny sky, wind=west 6-8 mph, soil surface was dry, 1-2 inches was moist, 3-4 inches was moist) when sugarbeets were in the early 4 to 6 leaf stage, wild buckwheat was from the 1 leaf stage to 2 inches tall, and green foxtail was 1-2 inches tall. Wild buckwheat and green foxtail control and sugarbeet injury were evaluated July 26.

Treatment	Rate (lb/A)	Sugarbeet injury rating	Green Foxtail control rating	Wild Buckwheat control rating
		-------------	(%)	-------------
Desmedipham+ATplus 411F	1+.25G	0	30	95
Desmedipham+ATplus 411F	2+.25G	3	53	98
Desm+Soybean (once refined)*	1+.25G	0	25	92
Desm+Soybean (once refined)*	2+.25G	8	64	98
Desm+Soybean methyl ester*	1+.25G	3	15	89
Desm+Soybean methyl ester*	2+.25G	5	36	97
Desmedipham+Herbex	1+.25G	8	18	61
Desmedipham+Herbex	2+.25G	9	59	94
Desmedipham	1	4	26	71
Desmedipham	2	5	55	97
Desmedipham+Agra SC	1+.25G	8	18	95
Desmedipham+Agra SC	2+.25G	6	79	97
Desm+Sunflower (once refined)*	1+.25G	4	19	78
Desm+Sunflower (once refined)*	2+.25G	8	68	99
Desm+Sunflower methyl ester*	1+.25G	4	40	89
Desm+Sunflower methyl ester*	2+.25G	5	67	98
Desmedipham+Cycloate	1+2	3	41	98
Desmedipham+Cycloate	1+1	5	26	88
Mean		5	41	91
High mean		9	79	99
Low mean		0	15	61
Coeff. of variation		130	34	10
LSD(1 Percent)		11	26	16
LSD(5 Percent)		9	20	12
No. of reps		4	4	4

* ATPlus 300F emulsifier combined with additive at 17%.

Summary

None of the treatments caused significant sugarbeet injury. Desmedipham at 1 lb/A gave less wild buckwheat control than desmedipham at 1 lb/A plus six of the eight additives. Only Herbex and once refined sunflower oil failed to improve wild buckwheat control. Herbex tended to reduce wild buckwheat control. None of the additives significantly improved control of green foxtail from desmedipham at 1 lb/A.

Postemergence applied tank-mix combinations of insecticides plus herbicides, St. Thomas, 1985. Hilleshog Monoricca sugarbeet was seeded 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 1:00 pm June 19 when the air temp. was 80F, soil temp. at six inches was 71F, wind was from the west at 6-8 mph, rel. hum. was 32%, soil was dry on the surface, moist at 1-4 inches, sugarbeets were in the 4-6 leaf stage, wild buckwheat was 1 leaf to 2 inches tall, and green foxtail was 1-2 inches tall. Ten sugarbeets from each plot treated with insecticide were rated by Dr. Albin Anderson and coworkers in Entomology July 29 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. Wild buckwheat and green foxtail control and sugarbeet injury were evaluated July 26.

Treatment*	Rate (lb/A)	Sugarbeet injury rating	GrnFxtl control rating	Wibw control rating	Sugarbeet damage rating
		----	(%)	----	(0 - 5)
Lorsban	2	0	0	0	1.9
Dyfonate	2	0	0	0	2.4
Furidan	2	0	0	0	2.2
Desmedipham	1	5	28	88	1.7
Sethoxydim+OC	.2+.25G	0	99	0	---
Fluazifop+OC	.188+.25G	0	97	0	---
Desmedipham+Dalapon	1+2	21	88	97	---
Desmedipham+Sethoxydim+OC	1+.2+.25G	20	98	97	---
Lorsban+Desmedipham	2+1	0	39	97	1.8
Lorsban+Sethoxydim+OC	2+.2+.25G	0	99	0	1.9
Lorsban+Fluazifop+OC	2+.188+.25G	0	70	0	1.8
Lorsban+Desm+Dalapon	2+1+2	9	88	99	1.4
Lorsban+Desm+Seth+OC	2+1+.2+.25G	13	98	97	1.7
Dyfonate+Desmedipham	2+1	5	33	95	1.5
Dyfonate+Sethoxydim+OC	2+.2+.25G	0	99	0	2.3
Dyfonate+Fluazifop+OC	2+.188+.25G	0	75	0	2.3
Dyfonate+Desm+Dalapon	2+1+2	25	88	99	1.2
Dyfonate+Desm+Seth+OC	2+1+.2+.25G	13	98	98	1.6
Furidan+Desmedipham	2+1	0	31	92	2.3
Furidan+Sethoxydim+OC	2+.2+.25G	0	99	0	1.4
Furidan+Fluazifop+OC	2+.188+.25G	0	96	0	2.1
Furidan+Desm+Dalapon	2+1+2	11	92	99	1.9
Furidan+Desm+Seth+OC	2+1+.2+.25G	4	99	97	2.1
Mean		5	70	50	1.9
High mean		25	99	99	2.4
Low mean		0	0	0	1.2
Coeff. of variation		94	9	5	21.1
LSD(1 Percent)		9	11	4	0.7
LSD(5 Percent)		7	9	3	0.6
No. of reps		4	4	4	4.0

* OC = Hopkin's Agicide Activator

Summary

Sugarbeets treated with Dyfonate plus desmedipham or combinations including desmedipham had less injury from root maggots than sugarbeets treated with Dyfonate alone. Sugarbeets treated with desmedipham alone were injured less than sugarbeets treated with Dyfonate alone. Sugarbeets treated with Furidan plus sethoxydim were injured less than sugarbeets treated with Furidan alone. Fluazifop alone gave better green foxtail control than fluazifop+Lorsban or fluazifop+Dyfonate. Desmedipham plus the insecticides gave better wild buckwheat control than desmedipham alone.

Herbicide combinations with Trifluralin, Crookston, 1985. Beta 1230 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 24. Treatments were applied in 17 gpa water at 40 psi to the center four rows of six row plots 11:00 am June 3 (sunny sky, air temp.=61F, soil temp. at six inches=54F, relative humidity=54%, soil surface was dry, 1-2 inches was moist, 3-4 inches was moist) when sugarbeets had 6 leaves, redroot pigweed was from 2 leaves to 1.5 inches tall, green foxtail was 1 - 3 inches tall, wild buckwheat had 4 - 8 leaves (1 - 3 inches tall), wild mustard had 4 - 6 leaves, kochia was 2 - 3 inches tall, and common lambsquarters had 4 - 6 leaves. Redroot pigweed, kochia, common lambsquarters, wild mustard, green foxtail, and wild buckwheat control and sugarbeet injury were evaluated July 11.

Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Kocz cntl ratg	Colq cntl ratg	Wimu cntl ratg	Grft cntl ratg	Wibw cntl ratg
		(%)						
Trifluralin	.75	0	0	0	0	0	0	0
Desmedipham	1	0	95	79	97	99	39	85
Sethoxydim+OC	.2+.25G	0	0	0	0	0	98	0
Desmedipham+Sethoxydim+OC	1+.2+.25G	0	96	89	97	99	94	91
Desmedipham+Dalapon	1+2	0	97	84	99	99	95	88
Trifluralin+Desmedipham	.75+1	0	97	89	98	99	45	86
Trifluralin+Sethoxydim+OC	.75+.2+.25G	0	0	0	0	0	98	0
Trifluralin+Desm+Seth+OC	.75+1+.2+.25G	0	94	89	95	99	95	90
Trifluralin+Desm+Dalapon	.75+1+2	0	95	89	99	99	94	90
Mean		0	64	58	65	66	73	59
High mean		0	97	89	99	99	98	91
Low mean		0	0	0	0	0	0	0
Coeff. of variation		0	3	8	5	0	11	6
LSD(1 Percent)		0	4	9	6	0	15	7
LSD(5 Percent)		0	3	7	4	0	11	5
No. of reps		4	4	4	4	4	4	4

* OC = Hopkin`s Agicide Activator

Summary

None of the treatments caused visible sugarbeet injury. Trifluralin had no influence on weed control from desmedipham+sethoxydim+OC, desmedipham+dalapon, or sethoxydim+OC. However, kochia control from desmedipham+trifluralin was greater than from desmedipham alone and similar to kochia control from desmedipham+sethoxydim+OC indicating that trifluralin may be acting as an oil additive in some situations. If this is true then trifluralin may increase sugarbeet injury in environments where injury was a problem.

Postemergence herbicides on weed free sugarbeets, Fargo, 1985. Great Western Mono-Hy R-103 sugarbeet was seeded 1.25 inches deep in 22 inch rows April 23. The first portion of all split application treatments was applied May 22. All single application treatments and the second portion of all split application treatments were applied May 27. Third and fourth herbicide applications to split treatments were applied June 7 and June 20 respectively. Weather data on the dates of application follows:

Date	Time of Day	Sky	Air Temp degF	Soil Temp at 6 inch degF	Rel Hum (%)	Wind Direction	Wind Speed (mph)	Sgbt leaf Stage
May 22	4:00 pm	cloudy	78	66	67	northeast	10	2
May 27	5:00 pm	cloudy	63	66	43	northeast	5	2-4
June 7	1:30 pm	sunny	88	68	25	west	12	4-8
June 20	4:00 pm	sunny	84	71	44	southeast	20	6-10

Soil at each application date was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. Sugarbeets were hand thinned to an 8 inch spacing, hand weeded June 5, and maintained weed free throughout the growing season. Sugarbeets were harvested from 56 feet of the center two rows of each plot September 24.

Treatment*	Rate (lb/A)	Sucros (%)	Root Yield (t/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popl per 56ft
FMC-57020	.25	15.2	19.8	1059	2.2	5065	68
FMC-57020	.5	15.3	19.2	1090	2.2	4928	67
FMC-57020	1	15.2	16.8	1078	2.2	4271	61
Untreated Check	.	15.1	19.7	1077	2.2	5026	75
Clopyralid	.125	15.2	20.1	1064	2.2	5135	70
Clopyralid	.19	15.3	19.5	1072	2.2	5006	72
Clopyralid	.25	15.2	19.5	1042	2.1	4982	73
Clopyralid	.5	15.2	19.2	1076	2.2	4887	71
Benazolin	.125	15.0	19.3	1114	2.2	4813	71
Benazolin	.25	14.7	18.8	1134	2.3	4601	71
Benazolin	.5	14.9	18.9	1041	2.1	4770	68
Acifluorfen	.125	15.1	18.4	1065	2.2	4696	76
Acifluorfen	.25	14.8	19.4	1189	2.4	4726	52
Acifluorfen	.37	14.1	15.3	1234	2.3	3523	38
Acifluorfen	.5	14.3	16.5	1186	2.3	3866	41
Acifluorfen+Surf WK	.125+.125%	14.6	17.3	1214	2.4	4108	49
Acifluorfen+Surf WK	.25+.125%	13.9	14.3	1224	2.3	3232	31
Acifluorfen+Surf WK	.37+.125%	13.1	12.7	1381	2.2	2638	23
Acifluorfen+Surf WK	.5+.125%	12.9	8.3	1451	2.5	1689	12

Table continued on next page.

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Treatment*	Rate (lb/A)	Sucros (%)	Root Yield (t/A)	Impur Index	Loss to Molas (%)	Extrac Sucros (lb/A)	Sgbt Popl per 56ft
Desm/Desm/Desm/Desm	.5/.5/1/1	15.2	19.3	1049	2.2	4976	68
De&Ph/De&Ph/De&Ph/De&Ph	.5/.5/1/1	15.4	19.5	1043	2.2	5042	68
Desm+Dala 2X/Desm+Dala 2X	.5+1/1+2	15.0	19.0	1096	2.2	4738	69
De&Ph+Dala 2X/De&Ph+Dala 2X	.5+1/1+2	14.9	18.1	1106	2.2	4497	66
Desmedipham+Dalapon	1+2	14.6	18.6	1186	2.3	4486	66
Desmedipham	3	15.6	20.4	1006	2.2	5419	59
Desmedipham+Herbex	3+.25G	15.2	19.1	1067	2.2	4875	60
Dalapon 4X	1	15.1	20.2	1065	2.2	5115	68
Dalapon 4X	2	14.5	20.1	1166	2.3	4820	75
Desmedipham 2X/Desmed+Dalapon	.5/1+2	14.9	19.3	1098	2.2	4829	67
Desm 2X/Desm+Sethoxy+OC	.5/1+.2+.25G	15.1	18.5	1044	2.1	4697	63
Desmedipham+Dalapon 2X	.5+1	14.8	18.9	1141	2.3	4637	69
De+Se+O 4X	.5+.2+.25G 2X/1+.2+.25G 2X	14.9	18.6	1074	2.2	4652	71
Des+Endo 2X/Des+Endo 2X	.5+.25/1+.5	15.7	19.3	977	2.1	5184	68
Desm+OC 2X/Desm+OC 2X	.5+.25G/1+.25G	15.0	19.4	1074	2.2	4912	72
D+Fl+O	.5+.188+.25G 2X/1+.188+.25G 2X	15.3	17.8	1036	2.2	4612	65
De 2X/De+Eth+Se+O	.5/.75+1.5+.2+.125G	15.4	20.4	1020	2.1	5367	69
Desmedipham 2X	.75	15.2	19.1	1085	2.2	4870	74
AC-222,293	.5	15.1	18.5	1115	2.3	4659	60
Mean		14.9	18.3	1112	2.2	4588	62
High mean		15.7	20.4	1451	2.5	5419	76
Low mean		12.9	8.3	977	2.1	1689	12
Coeff. of variation		5.0	9.5	13	10.2	11	11
LSD(1 Percent)		1.2	2.9	240	0.4	801	12
LSD(5 Percent)		0.9	2.2	183	0.3	610	9
No. of reps		5.0	5.0	5	5.0	5	5

* OC = Hopkin's Agicide Activator

Summary

FMC-57020 at 1 lb/A, acifluorfen at 0.37 and 0.5 lb/A, and acifluorfen plus surfactant WK at 0.125, 0.25, 0.37, and 0.5 lb/A reduced extractable sucrose compared to the untreated check. All these treatments and acifluorfen at 0.25 lb/A, desmedipham at 3 lb/A, desmedipham split applied at 0.5 lb/A plus desmedipham+dalapon at 1+2 lb/A, desmedipham+fluazifop+OC at 0.5+0.188 lb/A split applied plus desmedipham+fluazifop+OC at 1+0.188 lb/A split applied, and AC-222,293 at 0.5 lb/A reduced sugarbeet stands compared to the untreated check.

Amount of time needed for hand weeding following various herbicide treatments, Glyndon, 1985. 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 May 3 when the air temp. was 75F, soil temp. at six inches was 54F, wind was south at 10 mph, soil was dry at 0-2 inches and moist at 3-4 inches. ACH M-403 sugarbeet was seeded 1.25 inches deep in rows 1, 2, and 3 and ACH 164 was seeded in rows 4, 5, and 6. The first portion of split applied postemergence herbicide treatments was applied 9:30 am May 29 when the air temp. was 62F, wind was south at 15 mph, rel. hum. was 82%, sugarbeets were in the 2-4 leaf stage, redroot pigweed was cotyledon to 4 leaf (0.5 inches tall), kochia was cotyledon to 1 inch tall, and green foxtail was 0.5 to 1.5 inches tall. The second portion of split applied postemergence herbicide treatments was applied 1:30 pm June 4 when the sky was sunny, air temp. was 62F, soil temp. at six inches was 62F, wind was west at 7 mph, relative humidity was 46%, soil was dry on the surface, moist at 1-2 inches, moist at 3-4 inches, sugarbeets were in the 4 leaf stage, redroot pigweed was in the 2-4 leaf stage (1 inch tall), green foxtail was 0.5 to 2.5 inches tall, and kochia was 0.25 to 1.5 inches tall. Late splits of postemergence herbicide treatments were applied 12:30 pm June 20 when the sky was sunny, air temp. was 79F, soil temp. at six inches was 65F, relative humidity was 38%, wind was southeast at 15-20 mph, soil was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. Sugarbeets on June 20 were in the 8-10 leaf stage and weeds in the treated plots were second flush weeds ranging from the cotyledon stage to the 4 leaf stage. Redroot pigweed, kochia, and green foxtail control and sugarbeet injury were evaluated June 22. Time of hand weeding the four treated rows in each plot and the four untreated rows adjacent to each plot was recorded June 28. The time it took to weed the untreated rows minus the time of weeding the treated rows is reported as the "time saved" due to the respective herbicide treatments in this experiment. Sugarbeets were harvested from 72 feet of the center two rows of each plot September 30.

Treatment*	Rate (lb/A)	Sgbt inj ratg	Rrpw cntl ratg	Kocz cntl ratg	Gfxt cntl ratg	Time of hand weeding	Time saved
		-------	(%)	-------		--(min./plot)--	
EPTC+Cycloate	1.5+2.5	3	48	0	96	57.3	-12.1
Diethatyl	6	36	89	0	92	35.4	1.9
Ethofumesate	3.75	13	89	58	93	21.9	21.6
Desmedipham 2X	.5	0	95	87	70	24.4	26.4
Desmed/Desmed+Dalapon 2X	.5/.5+1	3	98	93	99	17.1	39.5
Des 2X/Des+Sethoxy+OC	.5/.5+.2+.25G	0	96	85	92	16.3	36.0
EPTC+Cycloate/Desmed 2X	1.5+2.5/.5	16	98	92	99	8.6	39.5
EPTC+Cy/De/De+Dala 2X	1.5+2.5/.5/.5+1	23	99	95	99	5.0	47.4
E+C/D 2X/D+Se+O	1.5+2.5/.5/.5+.2+.25G	24	99	96	99	3.8	43.8
Diethatyl/Desmedipham 2X	6/.5	49	97	92	99	8.8	29.6
Diethatyl/Des/Des+Dala 2X	6/.5/.5+1	50	99	96	99	3.2	37.4
Diet/De 2X/De+Seth+OC	6/.5/.5+.2+.25G	58	99	97	99	5.2	41.0
Ethofumesate/Desmedipham 2X	3.75/.5	26	99	99	99	3.2	35.7
Etho/Desm/Desm+Dala 2X	3.75/.5/.5+1	29	99	99	99	3.7	46.3
Et/De 2X/De+Se+OC	3.75/.5/.5+.2+.25G	18	99	99	99	1.8	36.3
Mean		23	93	79	95	14.4	31.4
High mean		58	99	99	99	57.3	47.4
Low mean		0	48	0	70	1.8	-12.1
Coeff. of variation		30	4	8	4	47.5	33.8
LSD(1 Percent)		13	7	12	8	12.8	19.9
LSD(5 Percent)		10	5	9	6	9.7	15.0
No. of reps		4	4	4	4	4.0	4.0

* OC = Hopkin's Agicide Activator

(Experiment continued on next page)

Experiment continued from last page.

Summary

Diethatyl caused significant and unusually high sugarbeet injury in this experiment. Ethofumesate and EPTC+cycloate caused less sugarbeet injury. All treatments except EPTC+cycloate and diethatyl reduced the time for hand weeding compared to time to weed adjacent untreated rows.

Amount of time needed for hand weeding following various herbicide treatments, Glyndon, 1985. (continued)

Treatment*	Rate (lb/A)	Sucro (%)	Root Yield (ton/A)	Impur Index	Loss to Mol (%)	Extra Sucro (lb/A)	Sgbt Popl per 72ft
EPTC+Cycloate	1.5+2.5	16.0	19.3	749	1.6	5491	66
Diethatyl	6	15.9	18.4	752	1.6	5183	48
Ethofumesate	3.75	15.8	20.9	803	1.7	5797	58
Desmedipham 2X	.5	16.0	22.3	757	1.6	6326	72
Desmed/Desmed+Dalapon 2X	.5/.5+1	16.0	22.8	781	1.7	6457	75
Des 2X/Des+Sethoxy+OC	.5/.5+.2+.25G	16.1	22.5	742	1.6	6444	75
EPTC+Cycloate/Desmed 2X	1.5+2.5/.5	16.1	23.0	765	1.6	6564	71
EPTC+Cy/De/De+Dala 2X	1.5+2.5/.5/.5+1	15.8	22.2	864	1.8	6141	59
E+C/D 2X/D+Se+O	1.5+2.5/.5/.5+.2+.25G	15.4	22.0	821	1.7	5947	63
Diethatyl/Desmedipham 2X	6/.5	15.8	18.1	843	1.8	5030	43
Diethatyl/Des/Des+Dala 2X	6/.5/.5+1	15.4	17.8	895	1.9	4763	39
Diet/De 2X/De+Seth+OC	6/.5/.5+.2+.25G	15.4	17.8	934	1.9	4786	45
Ethofumesate/Desmedipham 2X	3.75/.5	15.8	21.5	768	1.6	5999	62
Etho/Desm/Desm+Dala 2X	3.75/.5/.5+1	15.2	19.9	858	1.8	5258	57
Et/De 2X/De+Se+OC	3.75/.5/.5+.2+.25G	15.4	22.2	842	1.8	6027	59
Mean		15.7	20.7	811	1.7	5747	59
High mean		16.1	23.0	934	1.9	6564	75
Low mean		15.2	17.8	742	1.6	4763	39
Coeff. of variation		3.4	9.8	11	8.5	11	15
LSD(1 Percent)		1.0	3.8	170	0.3	1193	16
LSD(5 Percent)		0.8	2.9	128	0.2	897	12
No. of reps		4.0	4.0	4	4.0	4	4

* OC = Hopkin's Agicide Activator

Summary

The severe sugarbeet injury from diethatyl reduced or tended to reduce sugarbeet yield compared to plots treated with EPTC+cycloate or ethofumesate.

Mowing and herbicide treatments in disaster weed control conditions, Glyndon, 1985. ACH M-403 sugarbeet was seeded in rows 1, 2, and 3 and ACH-164 in rows 4, 5, and 6 on May 3. Early herbicide treatments were applied 11:00 am July 2 when the air temp. was 79F, soil temp. at six inches was 64F, relative humidity was 61%, soil was dry on the surface, moist at 1-2 inches, wet at 3-4 inches, sugarbeets were in the 10-12 leaf stage (8-12 inches tall), common lambsquarters was 4-10 inches tall, green foxtail was 6-8 inches tall, and kochia was 8-14 inches tall. Early mowing treatments were mowed to a height of 1.5 to 2 inches tall July 2. Herbicide treatments for the early delay plots were applied 10:30 am July 9 when the air temp. was 77F, soil temp. at six inches was 75F, wind was north at 16 mph, relative humidity was 67%, soil was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. On July 9 sugarbeets had regrown 2-6 large leaves and were 7 inches tall, common lambsquarters and green foxtail were 3-4 inches tall, and kochia was 5-6 inches tall. Late mowing treatments were mowed and late herbicide treatments were applied 2:30 pm July 16 when the air temp. was 84F, soil temp. at six inches was 70F, wind was south at 13 mph, soil moisture was dry on the surface down to two inches, moist at 3-4 inches, sugarbeets were 12-16 inches tall, kochia was 24-28 inches tall, green foxtial was 12-18 inches tall, and common lambsquarters was 24 inches tall. Herbicide treatments for the late delay plots were applied 2:00 pm July 22 when the air temp. was 79F, soil temp. at six inches was 67F, relative humidity was 44%, wind was south at 10-12 mph, soil was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. Sugarbeets had regrown 4 leaves and were 4-5 inches tall, green foxtail was 3 inches tall, common lambsquarters and kochia were 2-4 inches tall. Sugarbeets were thinned by hand to an 8 inch spacing June 27. Sugarbeets were harvested September 30 from 36 feet of each of the center two rows of each plot. Sugarbeet injury and common lambsquarters, kochia, and green foxtail control were evaluated August 2.

Treatment	Rate (lb/A)	Sgbt injury rating	Colq control rating	Kochia control rating	Gr.Fxtl control rating
		(%)			
Acifluorfen (July 2)	.25	0	0	0	0
Mowing Alone (July 2)		23	33	39	0
Acifluorfen (July 2)	.5	5	8	9	0
Mowing Alone (July 16)		55	83	85	86
Acifluorfen (July 16)	.375	11	10	0	0
Acifluorfen (July 16)	.5	18	13	0	0
Untreated check		0	0	0	0
Des&Phen+Dala (July 2/Delay)*	1.25+2	34	85	83	86
Des&Phen+Etho (July 2/Delay)*	1+1.5	34	95	92	68
Des&Phen+Dalapon (July 2)	1.25+2	5	29	8	74
Des&Phen+Etho (July 2)	1+1.5	6	63	51	10
Des&Phen+Dala (July 16/Delay)*	1.25+2	58	99	96	90
Des&Phen+Etho (July 16/Delay)*	1+1.5	60	97	96	92
Des&Phen+Dalapon (July 16)	1.25+2	3	24	3	35
Des&Phen+Etho (July 16)	1+1.5	5	36	11	16

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Treatment	Rate (lb/A)	Sgbt injury rating	Colq control rating	Kochia control rating	Gr.Fxtl control rating
		-------------	------------- (%)	-------------	-------------
Mean		21	45	38	37
High mean		60	99	96	92
Low mean		0	0	0	0
Coeff. of variation		26	31	27	27
LSD(1 Percent)		10	26	19	19
LSD(5 Percent)		8	20	15	14
No. of reps		4	4	4	4

* Mowed plots on date given and delayed herbicide treatment one week.

Summary

Acifluorfen gave poor weed control regardless of rate or date of application. Mowing July 16 gave better weed control than mowing July 2. Mowing on July 2 followed one week later by desmedipham+phenmedipham+dalapon or desmedipham+phenmedipham+ethofumesate gave better weed control than mowing alone.

Mowing and herbicide treatments in disaster weed control conditions, Glyndon, 1985. (continued)

Treatment	Rate (lb/A)	Sucros (%)	Root Yield (t/A)	Impur Index	Loss to Mol (%)	Extrac Sucros (lb/A)	Sgbt Popl per 72ft
Acifluorfen (July 2)	.25	16.7	8.1	584	1.3	2466	76
Mowing Alone (July 2)		15.8	8.1	685	1.4	2292	71
Acifluorfen (July 2)	.5	16.2	10.2	647	1.4	3008	74
Mowing Alone (July 16)		15.7	9.6	678	1.5	2730	83
Acifluorfen (July 16)	.375	16.1	9.4	643	1.4	2759	76
Acifluorfen (July 16)	.5	16.5	7.9	663	1.5	2364	71
Untreated check		16.3	9.9	686	1.5	3239	77
Des&Phen+Dala (July 2/Delay)*	1.25+2	15.7	10.2	770	1.6	2799	79
Des&Phen+Etho (July 2/Delay)*	1+1.5	16.0	10.5	716	1.5	2973	90
Des&Phen+Dalapon (July 2)	1.25+2	16.4	6.8	650	1.5	2025	70
Des&Phen+Etho (July 2)	1+1.5	16.6	12.2	660	1.5	3608	82
Des&Phen+Dala (July 16/Delay)*	1.25+2	14.8	11.0	861	1.8	2821	83
Des&Phen+Etho (July 16/Delay)*	1+1.5	15.4	11.3	765	1.6	3082	80
Des&Phen+Dalapon (July 16)	1.25+2	15.9	12.1	738	1.6	3368	77
Des&Phen+Etho (July 16)	1+1.5	16.7	12.2	645	1.4	3684	80
Mean		16.1	10.0	693	1.5	2881	78
High mean		16.7	12.2	861	1.8	3684	90
Low mean		14.8	6.8	584	1.3	2025	70
Coeff. of variation		3.6	23.7	12	9.9	25	13
LSD(1 Percent)		1.1	4.4	162	0.3	1350	19
LSD(5 Percent)		0.8	3.3	122	0.2	1015	14
No. of reps		4.0	4.0	4	4.0	4	4

* Mowed plots on date given and delayed herbicide treatment one week.

Summary

None of the treatments resulted in yields higher than the untreated check.

Herbicide treatments followed by rotary hoe and harrow, Glyndon, 1985. EPTC+ cycloate was applied and incorporated with a rototiller set four inches deep May 3 when the air temp. was 75F, soil temp. at six inches was 54F, wind was south at 10 mph, soil was dry down to two inches and moist at 3-4 inches. Sugarbeet was seeded 1.25 inches deep in 22 inch rows May 3 with ACH M-403 in rows 1, 2, and 3 and ACH 164 in rows 4, 5, and 6. The first half of split applied desmedipham was applied 9:30 am May 29 when the air temp. was 62F, rel. hum. was 82%, wind was south at 15 mph, sugarbeets were 2-4 leaf, and redroot pigweed was cotyledon to 4 leaf. All full rates of postemergence herbicides were applied 1:00 pm June 4 when the air temp. was 62F, soil temp. at six inches was 62F, wind was west at 7 mph, rel. hum. was 46%, sugarbeets were in the 4 leaf stage, and redroot pigweed was 2-4 leaf (1 inch tall). Postemergence herbicides were applied when the soil surface was dry, moist at 1-2 inches, and wet at 3-4 inches. All herbicides were applied in 17 gpa water at 40 psi to the center four rows of six row plots. A John Deere two bar rotary hoe operated 7 mph and a Melroe five bar spring tooth harrow operated 4.5 mph were used to apply the cultivation treatments to 8 foot plots across the herbicide plots June 20 when sugarbeets had 8-10 leaves and second flush redroot pigweed and escapes from the herbicide treatment were cotyledon to 4 in. tall. Sugarbeets were counted in 32 feet of row from each plot and redroot pigweed were counted in 32 square feet from each plot to determine percent stand reduction.

Herbicide Treatment* Rate (lb/A) / Cultivation Treatment	Sugarbeet stand reduction	Redroot Pigweed stand reduction
	---------- (%)	----------
EPTC+Cycloate (2+2)/Harrow	24	0
EPTC+Cycloate (2+2)/Hoe	33	4
EPTC+Cycloate (2+2)/Harrow 2X	13	15
EPTC+Cycloate (2+2)/Hoe 2X	43	0
EPTC+Cycloate (2+2)/Check	0	0
Desmedipham (1)/Harrow	10	27
Desmedipham (1)/Hoe	8	47
Desmedipham (1)/Harrow 2X	12	41
Desmedipham (1)/Hoe 2X	6	28
Desmedipham (1)/Check	0	0
Desmedipham+Dalapon (1+2)/Harrow	22	16
Desmedipham+Dalapon (1+2)/Hoe	13	17
Desmedipham+Dalapon (1+2)/Harrow 2X	29	21
Desmedipham+Dalapon (1+2)/Hoe 2X	20	6
Desmedipham+Dalapon (1+2)/Check	0	0
EPTC+Cycl(2+2)/Desmed(1)/Harrow	36	23
EPTC+Cycl(2+2)/Desmed(1)/Hoe	17	35
EPTC+Cycl(2+2)/Desmed(1)/Harrow 2X	30	42
EPTC+Cycl(2+2)/Desmed(1)/Hoe 2X	42	5
EPTC+Cycl(2+2)/Desmed(1)/Check	0	0
Des(.5)/Des+Seth+OC(1+.2)/Harrow	18	32
Des(.5)/Des+Seth+OC(1+.2)/Hoe	11	11
Des(.5)/Des+Seth+OC(1+.2)/Harrow 2X	8	42
Des(.5)/Des+Seth+OC(1+.2)/Hoe 2X	12	40
Des(.5)/Des+Seth+OC(1+.2)/Check	0	0
Mean	16	18
High mean	43	47
Low mean	0	0
Coeff. of variation	91	148
LSD(1 Percent)	27	49
LSD(5 Percent)	21	37
No. of reps	4	4

* OC = Hopkin's Agicide Activator

Experiment continued on next page.

Experiment continued from last page.

Summary

Sugarbeet stand was reduced or tended to be reduced by the cultivation treatment when compared to herbicide alone. Eight of the 20 herbicide plus cultivation treatments had significant sugarbeet stand reduction. Redroot pigweed stand was reduced or tended to be reduced by the cultivation treatment except EPTC + cycloate followed by harrow or rotary hoe 2X. However, only 5 of the 20 herbicide plus cultivation treatments had significant stand reduction of redroot pigweed.

Sugarbeet stand reduction and redroot pigweed stand reduction averaged over the five cultivation treatments.

Treatment	Rate (lb/A)	Percent Sugarbeet Stand Reduction	Percent Redroot Pigweed Stand Reduction
EPTC + Cycloate	2+2	23	4
Desmedipham	1.0	7	28
Desmedipham+Dalapon	1+2	17	12
EPTC+Cycloate/Desmedipham	2+2/1.0	25	21
Desmedipham/Desmedipham+Sethoxydim+OC	0.5/1+.2+.25G	10	25
LSD (0.05)		9	17

Sugarbeet stand reduction and redroot pigweed stand reduction averaged over the five herbicide treatments.

Cultivation Treatment	Percent Sugarbeet Stand Reduction	Percent Redroot Pigweed Stand Reduction
Harrow	22	19
Rotary Hoe	16	23
Harrow 2X	19	32
Rotary Hoe 2X	24	16
Herbicide alone	0	0
LSD (0.05)	9	17

Summary

Desmedipham alone tended to give less sugarbeet stand reduction and greater redroot pigweed stand reduction compared to the other herbicide treatments. EPTC + cycloate alone or in combination with desmedipham tended to give greater sugarbeet stand reduction than the other herbicide treatments. All cultivation treatments increased sugarbeet stand reduction compared to herbicide alone. All cultivation treatments increased or tended to increased redroot pigweed stand reduction.

Multispecies evaluation of preplant incorporated herbicides, Fargo (NW Section 22), 1985. Herbicides were applied in 17 gpa water at 40 psi to the center 7 feet of 10 foot plots and incorporated with a rototiller set two inches deep 11:00 a.m., June 10, when the air temp. was 68F, soil temp. at six inches was 58F, wind was southwest at 5 mph, relative humidity was 51%, soil dry on the surface, and wet below the surface. Marshal wheat, Moore oats, Siberian foxtail millet, Bush Johnson 19 sugarbeet, SeedTec 315 sunflower, McCall soybean, Fleetwood navy bean, Park barley, Pioneer 3737 corn, tame mustard, redroot pigweed, and wild buckwheat were seeded across herbicide plots June 10. Crop injury and weed control were evaluated July 25.

Treatments		Wht	Brly	Oats	Wibw	Sgbt	FxtM	Tmu	Rrpw	Sunf	Corn	Soyb	Dryb
Acetochlor	2	97	96	99	94	73	99	98	99	53	22	75	60
FMC-57020	0.75	99	99	97	97	90	97	85	65	50	85	18	30
FMC-57020	1.25	99	99	99	99	96	99	95	91	92	98	3	68
Alachlor	3	95	93	96	50	93	98	98	99	35	7	15	7
Cinmethylin	1.25	99	99	99	88	93	99	78	92	53	88	78	87
Imazaquin	0.25	95	98	96	99	99	97	99	99	99	99	17	53
Metolachlor	3	96	89	86	75	40	99	81	99	7	0	7	0
AC-263,499	0.125	89	90	91	99	99	99	99	99	98	77	37	43
RE-40885	1	97	73	93	99	99	99	99	99	22	73	91	98
RE-40885	2	99	92	99	99	99	99	99	99	33	98	99	99
Isoxaben	0.066	3	3	0	0	99	27	98	88	20	13	37	17
Isoxaben	0.088	7	7	3	58	99	30	99	85	42	12	55	50
Isoxaben	0.132	8	8	0	83	99	57	99	93	63	13	58	48
Ethalfluralin	0.94	98	97	98	99	99	99	40	99	8	87	40	3
Trifluralin	1	96	94	99	99	93	99	48	99	22	72	8	3
Butylate	4	95	92	67	33	0	88	53	92	10	17	58	20
Cyanazine-L	3	99	99	99	99	99	97	99	99	89	13	97	99
Metribuzin-F	0.25	98	99	99	99	99	94	99	98	86	55	57	89
Pyrazon-L	6	98	98	96	99	50	78	96	96	85	20	75	80
Mean		83	80	80	83	85	87	87	94	51	50	49	50
High mean		99	99	99	99	99	99	99	99	99	99	99	99
Low mean		3	3	0	0	0	27	40	65	7	0	3	0
Coeff. of variation		6	7	7	17	10	12	20	6	31	30	33	29
LSD(1 Percent)		11	13	12	30	18	22	38	13	35	33	35	32
LSD (5 Percent)		8	10	9	22	14	17	28	9	26	25	26	24
No. of reps		3	3	3	3	3	3	3	3	3	3	3	3

Summary

All herbicides were unusually phytotoxic to the test species. For example, trifluralin normally has no effect on tame mustard but gave 48% control in this experiment. Also acetochlor and cinmethylin are normally safe on soybeans but gave significant injury in this experiment. Metholachlor gave less sugarbeet injury than acetochlor, alachlor or cinmethylin. FMC-57020, metribuzin and imazaquin were more phytotoxic to dry beans than soybeans.

<u>Multispecies evaluation of preemergence herbicides, Fargo (NW Section 22), 1985.</u> Marshal wheat, Moore oats, Siberian foxtail millet, Bush Johnson 19 sugarbeet, SeedTec 315 sunflower, McCall soybean, Fleetwood navy bean, Park barley, Pioneer 3737 corn, wild buckwheat, tame mustard, redroot pigweed, and kochia were seeded across the herbicide plots June 10. Herbicides were applied in 17 gpa water at 40 psi to the center 7 feet of 10 foot plots 7:00 p.m. June 13 when the air temperature was 62F, soil temperature at six inches was 58F, wind was southeast at 8 mph, soil was dry on the surface, and wet below the soil surface. Crop injury and weed control were evaluated July 25.

Treatments		Wht	Brly	Oats	Wibw	Sgbt	FxtM	Tmu	Rrpw	Sunf	Corn	Soyb	Dryb	Kocz
Fluorochloridone	0.5	0	7	0	25	66	13	99	85	3	0	10	13	83
FMC-57020	0.75	18	22	22	55	12	58	85	10	7	0	5	0	92
FMC-57020	1.25	60	57	68	67	32	88	55	3	22	0	17	8	96
SC-0051	1	0	0	0	13	99	10	86	55	30	0	55	67	57
SC-0051	2	0	0	0	42	99	43	80	83	55	0	67	89	96
AC-263499	0.125	0	0	0	65	99	70	92	96	13	7	10	0	98
RE-40855	1	0	0	0	0	86	7	42	40	0	0	0	0	75
RE-40855	2	0	0	0	22	99	52	89	77	7	0	22	47	95
Isoxaben	0.132	0	0	0	5	50	7	30	28	3	3	0	0	0
Alachlor	3	0	0	0	13	12	95	83	73	13	0	0	0	20
Chloramben	3	0	10	0	73	50	72	47	93	0	8	25	0	81
Linuron	1.5	0	0	0	7	47	50	99	86	0	0	0	0	68
Linuron	3	0	8	7	27	85	85	99	96	20	0	0	0	93
Propachlor	5	0	0	0	7	27	90	17	78	0	0	0	0	28
Mean		6	7	7	30	62	53	72	65	12	1	15	16	70
High mean		60	57	68	73	99	95	99	96	55	8	67	89	98
Low mean		0	0	0	0	12	7	17	3	0	0	0	0	0
Coeff. of variation		97	123	90	67	28	32	21	27	112	337	86	40	23
LSD(1 Percent)		12	21	14	46	38	38	34	40	32	10	29	14	37
LSD(5 Percent)		9	15	10	34	28	28	25	29	23	7	22	11	28
No. of reps		3	3	3	3	3	3	3	3	3	3	3	3	3

Summary

First rain after herbicide application was 0.7 inch June 11 and 0.2 inch June 17. FMC-57020, SC-0051, AC-263,499, RE-40855, and linuron gave over 90% kochia control. None of the herbicides caused significant injury to corn. SC-0051 and RE-40855 were most injurious to dry beans.

Multispecies evaluation of postemergence herbicides, Fargo (NW section 22), 1985. Crops and weeds were seeded across herbicide plots June 10. Herbicides were applied in 17 gpa water at 40 psi to the center 7 feet of 10 foot plots 3:00 p.m., July 3 when the sky was sunny, air temperature was 88F, soil temperature at six inches was 72F, relative humidity was 46%, wind was northwest 12-15 mph, soil was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. At the time of application Marshal wheat, Moore oats, and Park barley were 5-7 inches tall, Bush Johnson 19 sugarbeets were in the 4 leaf stage, Kochia was 0.5 inch rosette diameter to 1.5 inches tall, wild buck-wheat and tame mustard were 1-3 inches tall, Siberian foxtail millet was 3 leaf (2 inches tall) to 4 inches tall, redroot pigweed was 2-4 leaf (1 inch tall), SeedTec 315 sunflower was 4 leaf (2-3 inches tall), Pioneer 3737 corn was 3-4 leaf (5-6 inches tall), McCall soybean was in the second trifoliate stage (2.5 inches tall), and Fleetwood navy bean was in the first trifoliate stage (2.5 inches tall). Weed control and crop injury were evaluated July 25.

Treatment		Wht	Brly	Oats	Wibw	Sgbt	FxtM	Wimu	Rrpw	Sunf	Corn	Soyb	Dryb	Kocz
FMC-57020	0.5	5	15	8	60	17	7	30	0	93	0	12	0	67
FMC-57020	1	17	37	22	63	38	20	53	10	95	0	15	5	63
DPX-M6316	0.021	0	0	0	99	99	5	99	99	99	0	22	93	30
AC-222293	0.5	0	0	98	96	93	0	99	35	10	0	93	93	75
Imazaquin	0.25	78	96	96	96	99	95	99	99	99	98	28	28	97
Fomesafen+X-77	0.25+0.25%	0	0	0	73	47	5	97	48	23	0	7	10	30
Lactofen+X-77	0.25+025%	0	0	0	18	73	3	99	98	43	0	40	18	97
Bentazon+OC	0.75+0.25G	0	0	0	95	96	7	99	68	99	0	10	7	92
Acifluorfen+X-77	0.375+0.25%	0	0	0	85	57	0	99	90	50	0	13	10	94
PPG-1013	0.03	12	15	0	93	91	7	99	93	35	3	28	30	98
AC-263499	0.125	35	35	43	97	99	96	99	88	98	7	18	15	72
DPX-L5300	0.021	0	0	0	97	99	23	96	92	99	3	88	87	90
Glyphosate	0.25	99	99	99	88	96	98	99	96	98	94	94	97	96
Paraquat	0.25	33	48	25	55	99	78	67	97	99	12	90	38	73
2,4-D	0.25	0	0	0	32	87	13	99	57	99	0	80	42	77
Dicamba	0.12	0	7	0	90	88	0	57	77	99	0	99	98	53
Bromoxynil	0.25	0	0	0	91	99	0	99	62	99	0	53	43	93
Mean		17	21	23	78	81	27	88	71	79	13	47	42	76
High mean		99	99	99	99	99	98	99	99	99	98	99	98	98
Low mean		0	0	0	18	17	0	30	0	10	0	7	0	30
Coeff. of variation		62	31	27	15	11	36	10	17	8	26	20	20	16
LSD(1 Percent)		23	14	14	26	20	21	19	27	14	7	21	18	27
LSD(5 Percent)		17	11	10	20	15	16	15	20	11	6	15	14	20
No. of reps		3	3	3	3	3	3	3	3	3	3	3	3	3

Summary

AC-222,293 gave good control of or high injury to wild buckwheat, sugarbeets, soybeans, and dry beans in addition to oats and tame mustard. Lactofen and acifluorfen gave greater control of redroot pigweed than bentazon and fomesafen. Bentazon gave greater control of sunflower and sugarbeet than lactofen, acifluorfen, and fomesafen. Lactofen gave less control of wild buckwheat than all treatments except 2,4-D. Lactofen gave more soybean injury than fomesafen, bentazon, and acifluorfen. Fomesafen gave less kochia control than lactofen, bentazon, and acifluorfen.

Wheat variety response to herbicides, Carrington, Langdon, Minot, and Williston, 1985. Durum and Hard Red Spring wheat varieties were seeded on April 22, May 20, and May 10 at Carrington, Langdon, and Minot, respectively. Difenzoquat at 1 lb/A was applied to all wheat varieties in the 4 to 5 leaf stage on June 12 at Carrington, June 13 at Langdon, and June 14 at Minot. DPX-M6316 at 1 oz/A, DPX-L5300 at 0.75 oz/A, and DPX-R9674 at 1 oz/A were also applied across all wheat varieties at Langdon, Minot, and Williston. The treatments were not replicated at a location. Wheat injury was evaluated two to four weeks after treatment.

See tables on following pages.

None of the wheat varieties exhibited any visible difenzoquat injury at Williston, probably due to the extremely dry growing conditions. 'Alex', 'Guard', 'Waldron', and '747' were the most susceptible Hard Red Spring wheat varieties to difenzoquat treatment. 'Laker', 'Vic', 'D-7925', 'D-79103', 'D-79168', 'D-8016', 'D-8019', 'D-81154', and 'HD-81-485' were more susceptible to difenzoquat than the other durum varieties. Injured durum varieties appeared to be more susceptible to yield reductions than injured Hard Red Spring wheat varieties. No varietal differances were evident with DPX-M6316, DPX-L5300, or DPX-R9674. DPX-M6316 caused uniform chorosis af all varieties at Langdon, but injury was not substantial.

Hard Red Spring wheat response to difenzoquat.

Variety	Injury				Height		Yield	
			Minot		Minot		Carrington	
	Carr	Lang	7/3	7/26	Trt	Untr	Trt	Untr
	(%)				(cm)		(Bu/A)	
Alex	70	10	80	40	93	100	35.4	40.0
Apex 83	0	0	0	0	82	79	37.3	53.4
Baart	20	20	0	0	108	105	43.1	41.9
Buckshot	20	0	50	0	91	85	40.3	57.9
Butte	40	0	0	0	90	96	39.5	27.5
Challenger	10	0	10	0	81	74	39.3	42.5
Columbus	40	5	0	0	101	101	39.6	46.9
Coteau	0	0	15	0	105	98	60.3	50.8
Era	10	--	10	0	89	80	59.6	62.5
Erik	30	5	10	0	87	93	43.5	48.9
Glenman	--	--	0	0	85	87	--	--
Guard	70	30	90	50	80	91	39.7	36.2
Katepwa	20	0	0	0	103	99	39.3	51.9
Leader	--	--	0	0	102	95	--	--
Leif	0	10	0	0	87	86	53.1	66.5
Len	70	25	20	5	91	87	31.9	28.8
Lew	--	--	50	15	105	100	--	--
Marshall	40	0	0	0	82	87	42.0	52.6
Norak	20	5	0	0	78	88	44.7	66.0
Norseman	70	20	30	10	72	78	42.3	59.1
Olaf	20	--	5	0	85	85	57.5	65.0
Oslo	20	--	10	0	83	81	66.8	64.4
Solar	--	0	0	0	90	78	--	--
Stoa	30	0	5	0	101	101	41.1	56.1
Success	10	0	0	0	89	98	34.5	49.4
Thatcher	80	0	80	35	83	102	41.9	50.0
Waldron	70	25	80	40	101	101	36.6	32.3
Walera	--	--	0	0	84	94	--	--
Wheaton	20	0	0	0	79	81	35.9	59.6
747	70	35	80	40	75	80	39.9	58.9
2369	30	0	0	0	80	90	51.4	50.6
HS-8155	80	3	50	30	79	94	44.4	63.0
HY-320	20	0	10	5	73	86	66.5	62.1
ND597	10	0	5	0	88	92	55.5	62.1
ND600	20	5	10	0	87	90	52.2	58.9
ND604	10	10	10	0	82	94	53.6	62.8
ND606	0	5	0	0	103	103	65.2	71.0
ND615	10	5	5	0	90	96	81.4	75.9
ND616	10	0	0	0	94	98	62.3	62.3
ND617	10	5	0	0	87	95	64.9	61.1
ND618	70	5	0	0	90	101	52.7	54.0
ND619	80	20	5	0	83	95	56.1	61.1
ND620	20	0	0	0	99	110	59.0	63.2
ND621	0	15	10	0	86	97	59.9	69.9

Carr = Carrington; Lang = Langdon; Trt = difenzoquat treated; Untr = untreated

Durum wheat response to difenzoquat.

Variety	Injury				Height		Yield	
			Minot		Minot		Carrington	
	Carr	Lang	7/3	7/26	Trt	Untr	Trt	Untr
Arcola	--	0	5	0	105	113	--	--
Cando	20	10	5	0	83	77	29.7	44.5
Crosby	20	5	5	0	109	107	32.1	54.8
Kyle	--	20	75	40	92	120	--	--
Laker	--	40	80	50	81	91	--	--
Lloyd	20	10	5	0	80	79	35.9	46.8
Medora	--	0	10	0	115	115	--	--
Mindum	--	--	20	0	123	132	--	--
Monroe	50	0	5	0	109	118	33.8	40.4
Rolette	20	5	5	0	98	112	49.2	61.1
Rugby	20	5	5	0	103	115	31.8	50.5
Vic	80	30	80	50	100	118	18.3	47.8
Ward	10	5	5	0	110	101	31.4	47.0
C8814	80	--	--	--	--	--	28.3	39.6
D-7925	80	30	75	30	92	99	27.7	53.5
D-79103	90	30	80	40	85	110	5.2	47.8
D-79104	30	30	10	10	87	95	35.2	53.6
D-79168	90	25	85	60	56	83	7.1	44.0
D-79209	30	0	5	5	74	76	40.1	46.3
D-8012	50	10	10	10	90	94	30.5	47.9
D-8016	90	35	60	35	83	93	12.3	38.3
D-8019	90	25	70	15	100	101	11.1	42.3
D-8172	50	10	25	5	101	110	16.9	35.9
D-8191	50	20	35	5	92	103	23.7	33.6
D-8193	30	5	20	5	91	105	43.2	43.2
D-8194	80	30	45	15	82	96	25.0	42.8
D-81114	20	5	5	0	90	101	42.3	39.7
D-81151	20	5	5	0	93	110	46.3	46.9
D-81154	80	30	80	40	84	101	17.1	47.7
D-81183	10	0	15	5	72	75	59.2	57.1
FA882-268	30	10	10	5	71	74	28.4	31.6
HD-81-466	20	0	0	0	78	82	26.2	44.2
HD-81-485	90	30	50	10	93	107	17.3	41.6

Carr = Carrington; Lang = Langdon; Trt = difenzoquat treatment; Untr = untreated

Barley response to diclofop, Langdon, 1985. Barley varieties were seeded on May 17. Diclofop was applied at 15 and 31 oz/A to 3 to 4 leaf barley on June 10 with 60F and 65% relative humidity. The experimental design was a randomized complete block with two replications. Barley injury was evaluated on July 25.

	Diclofop rate			
Variety	31 oz/A Injury	15 oz/A Yield	31 oz/A Yield	31/15oz Yield
	(%)	-------(Bu/A)------		(%)
Glenn	55	74.0	26.5	37
Morex	10	71.5	60.5	85
Azure	15	66.0	64.5	97
Robust	15	72.5	62.5	86
Hazen	30	70.5	61.0	87
Bedford	30	59.5	49.5	84
ND7309	30	53.5	42.0	80
ND7369	30	43.5	34.0	78
AB6B80-761	8	67.0	64.5	97
Clark	63	45.0	25.0	56
Bowman	15	79.0	73.0	93
TR 212	30	45.5	43.5	97
Lamont	25	53.5	42.5	79
Lewis	33	66.0	33.0	50
Harrington	43	61.5	33.5	58
Premier	65	48.0	19.5	41
ND6989	48	55.5	23.5	43
C.V. %	16	12.6	19.5	17
LSD 5%	11	16.2	18.5	26

Summary

Injury and yield reductions from diclofop at 31 oz/A were the greatest with 'Glenn', 'Clark', 'Lewis', 'Harrington', 'Premier', and 'ND689' barley varieties. 'AB6B80-761' appeared to be the most tolerant variety to diclofop injury.

Hard red spring wheat and durum response to herbicides, Fargo, 1985. Preplant incorporated (PPI) treatments were applied, soil incorporated with a field cultivator plus harrow twice, and 'Marshall'(Mar), 'Era', 'Len', 'Stoa', 'Alex', 'ND597'(597), and 'ND600'(600) Hard Red Spring and 'Rugby'(Ruby), 'Lloyd', and 'Vic' durum wheat were seeded on April 20. Postemergence (P) treatments were applied on May 22 to 4 to 5 leaf wheat and durum with cloudy sky, 65 F, and 50% RH. The experiment was a split block design with whole plots consisting of herbicide treatments and subplots consisting of cultivars. Treatments were replicated three times. Crop injury was evaluated June 20.

Treatments	Rate	Cultivar									
		Mar	Era	Len	Stoa	Alex	597	600	Ruby	Lloyd	Vic
	(oz/A)	(% injury)									
Triallate(PPI)	24	3	2	2	2	13	3	21	30	38	35
Triallate(PPI)	48	37	36	37	31	60	25	18	8	32	22
AC 222,293(P)	12	0	0	2	1	2	0	2	3	3	3
AC 222,293(P)	16	4	7	2	2	15	5	12	26	30	33
Fenoxaprop(P)	1.5	2	0	2	1	2	4	25	77	65	68
Fenoxaprop(P)	3	6	13	17	8	27	6	18	32	33	42
Difenzoquat(P)	16	8	11	21	10	41	8	8	9	18	12
Picloram+2,4-D(P)	0.38+6	0	0	0	0	0	2	2	2	2	3
Untreated	0	0	0	1	0	1	0	0	0	0	0
C.V. %		229	220	154	167	119	125	133	137	113	112
LSD 5%		NS	NS	NS	17	37	13	NS	NS	NS	NS
		(yield bu/A)									
Triallate(PPI)	24	66	67	63	73	59	74	62	69	67	62
Triallate(PPI)	48	49	45	52	63	36	63	60	73	78	54
AC 222,293(P)	12	73	75	71	79	73	72	65	65	70	78
AC 222,293(P)	16	72	72	67	76	72	76	69	68	73	69
Fenoxaprop(P)	1.5	65	77	69	80	70	78	67	63	40	61
Fenoxaprop(P)	3	65	71	64	74	67	76	56	32	17	33
Difenzoquat(P)	16	66	76	58	79	59	77	55	70	68	67
Picloram+2,4-D(P)	0.38+6	61	69	70	73	65	70	64	71	69	70
Untreated	0	59	73	68	83	72	78	69	75	79	66
C.V. %		14	17	8	8	9	7	10	15	19	14
LSD 5%		NS	NS	9	10	10	NS	NS	17	20	15

Summary

Alex and ND600 and all three durum cultivars were injured more than the other cultivars by PPI triallate at 24 oz/A. Triallate injury generally increased as the triallate rate was increased to 48 oz/A. AC 222,293 at 16 oz/A caused over 25% injury to the durum cultivars. AC 222,293 did not seriously injure the hard red spring wheat cultivars. Fenoxaprop at 1.5 and 3 oz/A injured and reduced the yield of all the durum cultivars and fenoxaprop at 3 oz/A injured Alex more than the other hard red spring wheat cultivars. Difenzoquat caused the greatest injury to Alex and Len.

Wheat seeding depth with triallate and trifluralin, Fargo, 1985. Treatments were applied to a dry surface on April 29 with 80F and 40% relative humidity. All treatments were cultivator plus harrow incorporated twice. 'Marshall' Hard Red Spring wheat was seeded 1.5 inches deep for the shallow(S) seeding, and 2.5 inches deep for the deep(D) seeding on April 30. All treatments were applied with a bicycle wheel type plot sprayer delivering 17 gpa at 35 psi. The experimental design was a split block with depth of seeding as the main block. Wheat injury was evaluated on June 17 (Date 1), and July 30 (Date 2). Wheat heights were taken at wheat maturity.

		Wheat injury					Wheat		Wheat	
		Date 1		Date 2		Wild	Height		Yield	
Treatment	Rate	S	D	S	D	oats	S	D	S	D
	(oz/A)	------(%)----				(%)	-(cm)-		(bu/A)	
Triallate	16	4	0	0	1	70	81	81	42	38
Triallate	32	14	1	8	1	96	82	82	42	44
Triallate	48	31	15	13	8	98	81	82	44	41
Trifluralin	8	14	5	1	0	38	82	81	33	31
Trifluralin	12	24	14	10	9	46	82	82	30	30
Tria+trif	16+8	16	5	6	8	90	80	82	41	39
Tria+trif	16+12	50	34	18	18	89	80	81	37	35
Tria+trif	32+8	35	13	11	9	97	80	82	43	41
Tria+trif	32+12	43	33	16	10	97	81	79	40	40
Tria+trif	48+8	40	18	12	9	98	81	81	41	41
Tria+trif	48+12	54	40	21	19	98	79	79	40	40
Untreated	0	0	0	0	0	0	82	77	21	24
C.V. %		35	52	65	80	19	3	2	9	13
LSD 5%		13	11	9	9	21	NS	3	5	7
# OF REPS		4	4	4	4	4	4	4	4	4

Summary

Wheat injury occurred from both triallate and trifluralin, and injury from the two herbicides in combination tended to be additive. The shallow seeded wheat tended to be injured more than the deep seeded wheat on June 17. The incorporation was rather shallow and some of the deep seeded wheat may have been below the treated soil. Wheat yield reflected wild oats control more than wheat injury.

<u>Durum wheat response to triallate and trifluralin, Langdon, 1985.</u> Early preplant(EPPI) treatments were applied and roto-till incorporated twice on May 3. Preplant(PPI) treatments were applied and roto-till incorporated twice on May 8. 'Cando' durum wheat was seeded 1.5 inches deep for the shallow(S) seeding, and 2.5 inches deep for the deep(D) seeding on May 8. The preemergence(PE) treatment was applied on May 13, and the postemergence treatment was applied at the 4 leaf wheat stage. The whole plot area was treated with 2,4-D at 4 oz/A to control broadleaf weeds. The experimental design was a randomized complete block with two replications.

Treatment	Rate	Strd S	Strd D	Injury S	Injury D	Moisture S	Moisture D	Yield S	Yield D
	(oz/A)	--(%)--		--(%)--		--(%)--		(Bu/A)	
Tria+trif(EPPI)	16+8	25	15	8	5	13	15	69	66
Tria+trif(EPPI)	12+6	10	28	5	5	16	15	75	55
Triallate(EPPI)	16	3	0	0	0	16	14	74	63
Trif(EPPI)	8	25	23	10	5	14	13	61	61
Tria+trif(PPI)	16+8	40	55	15	20	17	14	66	60
Tria+trif(PPI)	12+6	20	23	5	5	14	16	75	71
Triallate(PPI)	16	0	3	0	0	13	13	73	66
Trif(PPI)	8	23	13	8	5	16	15	73	62
Tria+trif(PE)	16+8	10	3	3	3	15	15	70	66
Diclofop(P)	16	0	0	0	0	15	15	71	68
No treatment	0	0	0	0	0	14	14	72	69
C.V. %		57	74	69	117	13	10	12	10
LSD 5%		18	24	7	NS	NS	NS	NS	NS

Summary

All treatments except diclofop or triallate applied alone reduced wheat stands and caused wheat injury. No consistent trends occurred due to depth of wheat seeding. Durum yields tended to be greater with shallow seeded wheat than deep seeded wheat.

Barley response to triallate and trifluralin, Langdon, 1985. Early preplant(EPPI) treatments were applied and roto-till incorporated twice on May 3. Preplant(PPI) treatments were applied and roto-till incorporated twice on May 8. 'Hazen' barley was seeded 1.5 inches deep for the shallow(S) seeding, and 2.5 inches deep for the deep(D) seeding on May 8. The preemergence(PE) treatment was applied on May 13 and the postemergence(P) treatment was applied at the 4 leaf barley stage. The whole plot area was treated with 2,4-D at 4 oz/A to control broadleaf weeds. The experimental design was a randomized complete block with two replications.

Treatment	Rate	Strd S	Strd D	Injury S	Injury D	Moisture S	Moisture D	Yield S	Yield D
	(oz/A)	--(%)--		--(%)--		--(%)--		(Bu/A)	
Tria+trif(EPPI)	16+8	20	25	5	3	19	26	92	91
Tria+trif(EPPI)	12+6	8	15	3	3	22	25	93	94
Triallate(EPPI)	16	5	15	3	3	17	25	99	96
Trif(EPPI)	8	10	15	0	5	20	27	105	92
Tria+Trif(PPI)	16+8	13	40	3	5	23	28	103	83
Tria+Trif(PPI)	12+6	13	23	0	5	23	26	92	85
Triallate(PPI)	16	5	5	0	0	19	25	97	96
Trif(PPI)	8	2	30	0	5	20	27	103	93
Tria+trif(PE)	16+8	40	30	5	5	21	28	96	77
Diclofop(P)	16	0	0	1	3	16	24	101	105
No treatment	0	0	0	0	0	16	25	91	89
C.V. %		77	31	165	56	21	8	10	9
LSD 5%		18	12	NS	NS	NS	NS	NS	NS

Summary

Barley injury was less than 5% with all treatments. All treatments except diclofop caused some barley stand reductions, which tended to be greater with the deep seeded barley than the shallow seeded barley. Barley yields tended to be greater with the shallow seeding than the deep seeding, possibly due to less stand reductions.

Triallate and chlorsulfuron in wheat, Fargo, 1985. Treatments were applied to a dry surface on April 29 with 80F and 40% relative humidity. All treatments were cultivator plus harrow incorporated twice. 'Marshall' Hard Red Spring wheat was seeded 1.5 inches deep for the shallow(S) seeding, and 2.5 inches deep for the deep(D) seeding on April 30. All treatments were applied with a bicycle wheel type plot sprayer delivering 17 gpa at 35 psi. The experimental design was a split block with depth of seeding as the main plot, and four replications. Wheat injury was evaluated on June 6 (Date 1) and July 30 (Date 2). Wheat heights were taken at wheat maturity.

Treatment	Rate	Date 1 S	Date 1 D	Date 2 S	Date 2 D	Wild oats	Height S	Height D	Wheat Yield S	Wheat Yield D
	(oz/A)	--(% injury)--				(%)	-(cm)-		--(bu/A)---	
Triallate	24	9	4	1	1	95	82	83	41.4	44.0
Triallate	48	31	16	8	3	98	82	81	40.2	41.0
Clsu	0.33	4	0	0	0	34	82	79	28.2	27.3
Clsu	0.5	10	2	0	0	45	82	81	29.5	29.6
Tria+Clsu	24+.33	12	7	5	3	73	83	83	43.9	44.6
Tria+Clsu	24+0.5	11	7	3	4	95	82	81	42.4	44.2
Tria+Clsu	48+.33	23	13	6	3	97	82	81	38.1	44.0
Tria+Clsu	48+0.5	22	11	13	3	97	77	80	37.3	40.2
Untreated	0	0	0	0	0	0	85	77	21.1	22.7
C.V. %		37	44	82	152	23	3	3	11.3	8.7
LSD 5%		7	4	5	NS	24	4	3	5.9	4.7

Summary

Wheat injury was expressed more at the early evaluation date, and tended to be greater with the shallow seeding than the deep seeding. The deep seeded wheat may have been placed below the treated soil zone due to shallow incorporation. Triallate injured the wheat more than chlorsulfuron, and injury was similar for triallate applied alone or in combination with chlorsulfuron. All treatments including triallate provided good wild oats control. Wheat yields generally related to wild oats control more than crop injury.

Wild oats control in wheat, Fargo, 1985. 'Marshall' Hard Red Spring wheat was seeded on April 19. Stage 1(S1) treatments were applied to 3 leaf wheat and wild oats on May 22 with 67F and 50% relative humidity. Stage 2(S2) treatments were applied to 5 leaf wheat and wild oats on May 31 with 60F and 70% relative humidity. The experimental design was a randomized complete block with four replications. Crop injury and wild oats control were evaluated on July 26.

Treatment	Rate	Height	Wheat Yield	Injury	Wild oats
	(oz/A)	(cm)	(Bu/A)	(%)	(%)
Barban(S1)	4	84	52.9	0	66
Barban(S1)+N	4+1G	84	48.6	0	71
Barban(S1)	6	82	51.3	0	72
Diclofop(S1)	8	80	49.7	0	65
Diclofop(S1)	12	82	48.8	0	85
Diclofop(S1)+PO	8+0.125G	85	68.0	0	90
Diclofop(S1)+PO	12+0.125G	83	55.8	3	88
Diclofop+Barban(S1)	8+4	80	51.1	0	75
AC 222,293(S1)	4	82	59.1	3	90
AC 222,293(S1)	6	79	62.8	1	96
Fenoxaprop(S1)	1.5	79	51.2	1	71
Fenoxaprop(S1)	3	81	65.6	4	92
Diclofop(S2)	16	79	58.4	4	98
Diclofop+PO(S2)	16+0.125G	82	62.1	2	97
Barban(S2)	4	80	51.4	0	65
Barban(S2)	6	82	52.8	1	59
Difenzoquat(S2)	6	82	52.9	0	78
Difenzoquat(S2)	12	82	56.8	6	89
Difenzoquat+Barban(S2)	6+4	82	59.9	1	78
AC 222,293(S2)	6	83	61.9	1	76
AC 222,293(S2)	8	87	73.0	3	97
Fenoxaprop(S2)	1.5	78	71.7	13	99
Fenoxaprop(S2)	3	74	56.0	23	99
Untreated	0	81	42.3	0	0
C.V. %		4	15.9	91	13
LSD 5%		5	12.7	3	15

Summary

None of the herbicide treatments caused any substantial wheat injury except for the S2 treatments with fenoxaprop. AC 222,293 was more effective in controlling 3 leaf than 5 leaf wild oats. Wild oats control with diclofop at 8 oz/A was greater with the addition of PO. Diclofop at 16 oz/A provided greater than 95% control of wild oats in the 5 leaf stage.

Wild oats control in wheat, Minot, 1985. 'Coteau' Hard Red Spring wheat was seeded on April 30. Stage 1(S1) treatments were applied to 2 leaf wheat and wild oats on June 1 with 60F and 55% relative humidity. Stage 2(S2) treatments were applied to 4 leaf wheat and wild oats on June 10 with 70F and 40% relative humidity. The experimental design was a randomized complete block with four replications. Wheat injury and wild oats control were evaluated on July 16.

Treatment	Rate	Wheat		Wild oat
	(oz/A)	Yield (Bu/A)	Injury (%)	control (%)
Barban(S1)	4	41.2	0	61
Barban(S1)+N	4+1G	47.2	0	74
Barban(S1)	6	37.9	6	69
Diclofop(S1)	8	46.9	0	77
Diclofop(S1)	12	48.8	0	82
Diclofop(S1)+PO	8+0.125G	59.9	0	91
Diclofop(S1)+PO	12+0.125G	59.1	0	96
Diclofop+Barban(S1)	8+4	55.1	9	86
AC 222,293(S1)	4	53.1	0	85
AC 222,293(S1)	6	57.8	0	90
Fenoxaprop(S1)	1.5	47.6	0	59
Fenoxaprop(S1)	3	57.5	3	88
Diclofop(S2)	16	49.8	0	77
Diclofop+PO(S2)	16+0.125G	51.8	0	81
Barban(S2)	4	33.8	0	18
Barban(S2)	6	32.3	0	40
Difenzoquat(S2)	6	32.1	0	24
Difenzoquat(S2)	12	35.1	0	70
Difenzoquat+Barban(S2)	6+4	35.1	0	19
AC 222,293(S2)	6	39.2	0	59
AC 222,293(S2)	8	44.7	0	73
Fenoxaprop(S2)	1.5	40.4	0	65
Fenoxaprop(S2)	3	44.9	1	76
Untreated	0	28.4	0	0
C.V. %		13.9	278	14
LSD 5%		8.8	3	13

Summary

None of the treatments caused any substantial wheat injury. AC 222,293 at the S1 stage and treatments including diclofop provided the best wild oats control. The addition of petroleum oil(PO) to diclofop tended to increase wild oats control compared to diclofop applied alone. Wheat yields generally related to wild oats control.

Wild oats control in wheat, Williston, 1985. 'Stoa' Hard Red Spring wheat was seeded into fallowed soil on April 30. Treatments were applied May 17 (2Lf) to 2 leaf wheat and wild oats and 2 to 3 inch Russian thistle with 46F and 80% relative humidity, or to 5 leaf wheat, 4 leaf wild oats, and 4 to 6 inch Russian thistle on May 29 (4Lf) with 67F and 66% relative humidity. All treatments were applied with a bicycle wheel type plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block design with four replications. Crop injury and weed control were evaluated on July 15.

Treatment	Rate	Wioa	Ruth	Wheat Injury	Wheat Yield	Wheat Tswt
	(oz/A)	(% Control)		(%)	(bu/A)	(lb/bu)
Barban(2Lf)	4	78	5	0	8.0	48.2
Barban+Nitrogen(2lf)	4+1G	66	0	0	6.9	46.9
Barban(2Lf)	4	78	0	0	7.3	48.9
Diclofop(2Lf)	8	41	0	0	8.5	47.7
Diclofop(2Lf)	12	68	0	3	8.3	47.0
Diclofop+PO(2lf)	8+0.125G	69	0	0	8.5	48.9
Diclofop+PO(2lf)	12+0.125G	76	0	3	8.9	49.9
Dicl+Barban(2Lf)	8+4	94	0	3	7.7	48.6
AC 222,293(2Lf)	4	97	48	0	10.0	48.9
AC 222,293(2Lf)	6	99	64	9	10.5	49.7
Fenoxaprop(2Lf)	1.5	47	0	0	8.1	48.7
Fenoxaprop(2Lf)	3	85	0	4	7.3	49.3
Diclofop(4Lf)	16	84	0	0	7.4	48.9
Diclofop+PO(4Lf)	16+0.125G	92	0	1	7.5	48.9
Barban(4Lf)	4	40	0	0	8.0	48.3
Barban(4Lf)	6	65	0	0	8.3	49.3
Difenzoquat(4Lf)	6	45	0	3	8.6	48.1
Difenzoquat(4Lf)	12	76	10	3	8.6	49.1
Dife+Barban(4Lf)	6+4	51	0	3	8.2	47.6
AC 222,293(4Lf)	6	98	26	0	10.1	49.6
AC 222,293(4Lf)	8	99	33	0	8.6	48.6
Fenoxaprop(4Lf)	1.5	87	0	13	6.6	48.7
Fenoxaprop(4Lf)	3	93	0	19	7.2	50.0
Untreated		0	0	0	7.7	49.1
C.V. %		16	101	264	18.2	--
LSD 5%		16	11	9	2.1	--
No. of reps		4	4	4	4	1

Summary

Fenoxaprop at 1.5 and 3 oz/A caused 13 and 19% wheat injury, respectively. The other treatments caused only slight injury. AC 222,293 provided excellent wild oats control and some Russian thistle control at both treatment dates. The additiion of petroleum oil increased wild oats control with diclofop compared to diclofop applied alone. Wild oats control with diclofop plus barban was greater than either herbicide applied alone at the rate used in the tank mix. Wheat yields were low and generally related to weed control and/or crop injury.

Wild oats control in wheat, Langdon, 1985. 'Crosby' durum wheat was seeded on April 29. Stage 1(S1) treatments were applied to 2 to 3 leaf wheat and 1 to 3 leaf wild oats on May 21 with 60F and 50% relative humidity. Stage 2(S2) treatments were applied to 4 leaf wheat and 3 to 4 leaf wild oats on June 7 with 70F and 65% relative humidity. The experimental design was a randomized complete block with four replications. Crop injury and wild oats control were evaluated on July 25.

Treatment	Rate	Wheat injury	Wild oats	Wheat Tswt	Wheat Yield
	(oz/A)	(%)	(%)	(lb/Bu)	(Bu/A)
Dife+brox&MCPA(S2)	10+0.25+0.25	3	64	60.0	13.7
Barban (S1)	6	0	63	61.5	18.0
Barban+Brox (S1)	6+4	0	56	61.5	19.3
Diclofop (S1)	12	0	71	61.0	30.4
Diclofop+PO (S1)	12+0.125G	0	82	61.0	35.7
Diclofop+Barban(S1)	8+4	0	69	61.0	23.9
Diclofop+Brox (S1)	12+4	1	81	61.5	33.8
Dicl+Brox+MCPA(S1)	12+4+1	0	76	61.0	28.2
AC 222,293 (S1)	6	0	91	61.5	36.0
AC 222,293+MCPA(S1)	6+4	0	83	61.0	29.4
Difenzoquat (S2)	10	0	68	60.5	9.0
Dife+MCPA-dma (S2)	10+4	0	56	60.5	10.5
Dife+Barban (S2)	6+4	5	58	61.5	9.6
Diclofop (S2)	16	3	95	61.0	17.8
Diclofop+PO (S2)	16+0.125G	5	96	61.0	13.3
Control	0	0	0	61.5	6.6
C.V. %		251	17	--	26.9
LSD 5%		4	17	--	8.0
# of Reps		4	4	1	4

Summary

None of the herbicide treatments caused any substantial injury. Wild oats control with diclofop was better with 16 oz/A at the S2 stage than with 12 oz/A at the S1 stage. The addition of petroleum oil tended to enhance wild oats control with diclofop at the S1 stage. AC 222,293 provided good wild oats control. Durum yields generally related to wild oats control and application stage. Heavy wild oats densities apparently competed with wheat prior to control with the S2 treatments.

Wild oats control, Fargo, 1985. An experiment was conducted at Fargo, ND on a silty clay soil with 7.5 pH and 6.1% organic matter to evaluate wild oat control with several herbicides. Preplant incorporated treatments were applied April 24 with 50F and 40% relative humidity and field cultivator and harrow incorporated twice. "Marshall" hard red spring wheat was seeded and preemergence incorporated(PEI) treatments were applied and harrow incorporated twice. Precipitation for a 2 week period following wheat seeding was 0.22 inches. P1 treatments were applied May 22 with 50F, 60% relative humidity and clear skies to 3 leaf wheat and 2 leaf wild oats. P2 treatments were applied June 3 with 65F, 70% relative humidity, and cloudy skies to 5 leaf wheat and wild oats. Wheat injury and wild oat control were evaluated July 26.

Treatment	Rate	Wheat injury	Wild oats
	(oz/A)	(%)	(% control)
Triallate (PPI)	16	9	90
Triallate-G (PPI)	16	0	70
Triallate (PEI)	16	0	68
Barban (P1)	6	0	66
Barban+Diclofop (P1)	4+8	0	85
Diclofop (P1)	12	0	91
Diclofop+PO (P1)1	12+0.25G	0	94
AC-222293 (P1)1	6	0	97
Fenoxaprop+PO (P1)	2+0.25G	3	97
Difenzoquat (P2)	10	0	94
Dife+Bargan (P2)	8+4	0	93
No Treatment		0	0
HIGH MEAN		9	97
LOW MEAN		0	0
EXP MEAN		1	78
C.V. %		329	11
LSD 5%		4	13
LSD 1%		NS	17
# OF REPS		4	4

Summary

No substantial wheat injury occurred with any treatments. Wild oats control with triallate was higher with the PPI spray treatment than with the PPI granular treatment or PEI spray treatment. All postemergence treatments provided 85% or greater wild oats control except barban at 6 oz/A.

Diclofop and difenzoquat plus broadleaf herbicides in wheat, Fargo, 1985. 'Marshall' Hard Red Spring wheat was seeded on April 19. Treatments were applied to 3 to 5 leaf wheat and wild oats on May 31 with 67F and 70% relative humidity. The experimental design was a randomized complete block with four replications. Wheat injury and wild oats control were evaluated on July 22. The wild oats density was approximately 75 plants per square foot.

Treatment	Rate	Wheat Yield	Wheat Injury	Wild oats	Wild mustard
	(oz/A)	(Bu/A)	(%)	(% control)	
Diclofop	12	58.8	0	92	0
Diclofop+Brox-RP	12+4	74.3	3	92	99
Diclofop+MCPA-bee	12+.5	64.2	1	88	97
Diclofop+MCPA-bee	12+1	80.5	0	86	99
Dicl+Brox-RP+MCPA-bee	12+4+.5	81.2	0	92	99
Dicl+Brox-RP+MCPA-bee	12+4+1	80.2	1	91	99
Diclofop+Clpy+Brox-RP	12+1.5+4	85.9	0	93	99
Dicl+Fluorochloridone	12+2	70.5	4	93	99
Dicl+Brox-RP+Fluo	12+2+2	85.8	0	93	99
Dicl+Brox-RP+Fluo	12+4+1	74.8	0	92	99
Difenzoquat	12	57.6	0	91	18
Dife+Clpy&MCPA-bee	12+5	77.5	1	94	99
Dife+Clpy&MCPA-bee	12+10	66.4	1	92	99
Untreated	0	38.2	0	0	0
C.V. %		13.5	247	4	7
LSD 5%		13.8	NS	5	8

RP=Rhone Poelenc;

Summary

No substantial wheat injury resulted from any of the treatments in the experiment. All treatments except diclofop or difenzoquat alone gave 99% wild mustard control. None of the broadleaf herbicides caused an obvious reduction of wild oats control with diclofop or difenzoquat. Wheat yields generally related to weed control.

Diclofop and difenzoquat plus broadleaf herbicides in wheat, Minot, 1985. 'Coteau' Hard Red Spring wheat was seeded on May 15. Treatments were applied to 3 to 3.5 leaf wheat and wild oats on June 5 with 60F and 65% relative humidity. The experimental design was a randomized complete block with four replications. Wheat injury and wild oats control were evaluated on July 16. The wild oats density was approximately 25 plants per square foot.

Treatment	Rate	Wheat		Wild
		Yield	Injury	oats
	(oz/A)	(Bu/A)	(%)	(%)
Diclofop	12	36.5	0	90
Diclofop+Brox-RP	12+4	35.6	0	83
Diclofop+MCPA-bee	12+.5	35.0	3	88
Diclofop+MCPA-bee	12+1	37.4	0	88
Dicl+Brox-RP+MCPA-bee	12+4+.5	35.7	0	91
Dicl+Brox-RP+MCPA-bee	12+4+1	42.4	0	90
Dicl+Clpy+Brox-RP	12+1.5+4	34.1	0	86
Dicl+Fluorochloridone	12+2	30.3	0	64
Dicl+Brox-RP+Fluo	12+2+2	25.7	1	46
Dicl+Brox-RP+Fluo	12+4+1	28.8	0	68
Difenzoquat	12	31.1	0	72
Dife+Clpy&MCPA-bee	12+5	28.7	0	70
Dife+Clpy&MCPA-bee	12+10	28.4	3	75
Untreated	0	15.2	0	0
C.V. %		16.8	459	9
LSD 5%		7.6	NS	9

RP=Rhone Poulenc;

Summary

Wheat had good tolerance to all of the herbicide treatments. Diclofop generally gave better wild oats control than difenzoquat. Wild oats control with diclofop was reduced when applied in combination with fluorochloridone. Bromoxynil, MCPA, or clopyralid did not reduce wild oats control with diclofop or difenzoquat in the experiment. Wheat yields generally related to the level of wild oats control.

Wild oats herbicides plus sulfonyl ureas in wheat, Fargo, 1985. 'Marshall' Hard Red Spring wheat was seeded on April 22. Treatments with barban were applied to 3 leaf wheat and wild oats, and 1 inch wild mustard on May 22 with 45F and 65% relative humidity. All other treatments were applied to 4 leaf wheat, 4 to 5 leaf wild oats, and 2 inch wild mustard on May 31 with 60F and 70% relative humidity. The experimental design was a randomized complete block with four replications. Weed control and crop injury were evaluated on July 22.

Treatment	Rate	Wheat Yield	Wheat Injury	Wioa	Wimu
	(oz/A)	(Bu/A)	(%)	(% control)	
Barban	6	57.3	0	81	13
Barban+DPX-M6316	6+.25	61.1	0	76	99
Barban+DPX5300	6+.25	65.4	0	79	99
AC222293	6	69.6	0	87	99
AC222293+DPX-M6316	6+.25	67.3	0	90	99
AC222293+DPX-M6316	6+1	64.9	0	90	99
AC222293+DPX-L5300	6+.25	68.6	0	88	99
AC222293+DPX-L5300	6+.5	72.3	0	94	99
Diclofop	12	70.9	0	95	0
Diclofop+DPX-M6316	12+.25	67.0	0	93	99
Diclofop+DPX-M6316	12+1	65.4	1	91	99
Diclofop+DPX-L5300	12+.25	66.9	0	97	99
Diclofop+DPX-L5300	12+.5	69.0	0	94	99
Difenzoquat	12	63.8	0	86	49
Difenzoquat+DPX-M6316	12+.25	57.4	0	83	99
Difenzoquat+DPX-M6316	12+1	62.5	0	93	99
Difenzoquat+DPX-L5300	12+.25	62.8	1	88	99
Difenzoquat+DPX-L5300	12+.5	64.2	1	85	99
Untreated	0	42.6	0	0	0
C.V. %		11.4	475	6	8
LSD 5%		10.4	NS	8	9

Summary

None of the herbicide treatments caused any substantial wheat injury. All treatments except barban, diclofop, or difenzoquat applied alone, provided excellent wild mustard control. Addition of DPX-L5300 or DPX-M6316 to AC 222,293 tended to increase wild oats control compared to AC 222,293 applied alone. Addition of DPX-L5300 or DPX-M6316 had no apparent influence on wild oats control with barban, diclofop, or difenzoquat. Wheat yields generally related to wild oats control.

Wild oats herbicides plus sulfonyl ureas in wheat, Minot, 1985. 'Coteau' Hard Red Spring wheat was seeded on May 15. Treatments were applied to 3.5 leaf wheat and wild oats on June 5 with 65F, 45% relative humidity, and clear skies. The experimental design was a randomized complete block with four replications. Crop injury and wild oats control were evaluated on July 16.

Treatment	Rate	Wheat Yield	Wheat Injury	Wild oats
	(oz/A)	(Bu/A)	(%)	(%)
AC222293	6	38.3	1	79
AC222293+DPX-M6316	6+.25	40.7	3	91
AC222293+DPX-M6316	6+1	39.1	3	88
AC222293+DPX-L5300	6+.25	45.8	0	93
AC222293+DPX-L5300	6+.5	41.8	0	89
AC222293+Metsulfuron	6+.06	42.8	1	87
Diclofop	12	43.2	0	80
Diclofop+DPX-M6316	12+.25	39.3	0	83
Diclofop+DPX-M6316	12+1	43.0	1	82
Diclofop+DPX-L5300	12+.25	34.4	0	73
Diclofop+DPX-L5300	12+.5	30.0	0	58
Diclofop+Metsulfuron	12+.06	32.3	0	65
Difenzoquat	12	28.7	0	67
Difenzoquat+DPX-M6316	12+.25	27.1	0	66
Difenzoquat+DPX-M6316	12+1	23.0	0	55
Difenzoquat+DPX-L5300	12+.25	23.0	0	60
Difenzoquat+DPX-L5300	12+.5	27.8	0	68
Difenzoquat+Metsulfuron	12+.06	27.7	0	65
Untreated	0	19.6	0	0
C.V. %		17.4	299	8
LSD 5%		8.4	NS	8

Summary

None of the herbicide treatments caused any substantial wheat injury. Wild oats control was highest with AC 222,293 applied in combination with DPX-M6316, DPX-L5300, or metsulfuron. The addition of DPX-M6316, DPX-L5300, or metsulfuron to AC 222,293 increased wild oats control compared to AC 222,293 applied alone. The addition of DPX-L5300 or metsulfuron to diclofop decreased wild oats control compared to diclofop applied alone. Wild oats control with difenzoquat was not influenced by the addition of the broadleaf herbicides. Wheat yields generally related to the level of wild oats control.

<u>Wild oats herbicides plus sulfonyl ureas in wheat, Williston, 1985.</u> 'Stoa' Hard Red Spring wheat was seeded on April 30. Treatments were applied to 3 leaf wheat, 3 to 4 leaf wild oats, and 1 to 5 inch Russian thistle on May 24 with 70F and 51% relative humidity. All treatments were applied with a bicycle wheel type plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with four replications. Wheat injury and weed control were evaluated on July 16.

Treatment	Rate	Wioa	Ruth	Wheat Injury	Wheat Yield	Tswt
	(oz/A)	(% control)		(%)	(bu/A)	
AC 222,293	6	99	64	0	12.0	52.8
AC293+DPX-M6316	6+0.25	99	91	0	13.7	53.9
AC293+DPX-M6316	6+1	99	96	0	13.5	54.3
AC293+DPX-L5300	6+0.25	97	84	0	11.5	53.3
AC293+DPX-L5300	6+0.5	99	90	0	12.5	52.9
AC293+metsulfuron	6+0.06	99	91	0	13.6	53.5
Diclofop	12	81	20	0	10.5	50.7
Dicl+DPX-M6316	12+0.25	76	92	0	11.5	52.4
Dicl+DPX-M6316	12+1	78	99	0	12.5	54.5
Dicl+DPX-L5300	12+0.25	79	99	0	13.3	53.8
Dicl+DPX-L5300	12+0.5	80	99	0	11.5	53.1
Dicl+metsulfuron	12+0.06	75	98	0	12.8	53.7
Difenzoquat	12	93	64	0	10.5	52.8
Dife+DPX-M6316	12+0.25	86	98	0	12.7	54.7
Dife+DPX-m6316	12+1	83	98	0	12.9	55.6
Dife+DPX-L5300	12+0.25	90	98	1.25	12.5	54.9
Dife+DPX-L5300	12+0.5	91	87	0	11.9	54.8
Dife+metsulfuron	12+0.06	94	98	0	11.8	55.1
Untreated	0	0	0	0	8.1	50.1
C.V. %		8	15	872	14.1	--
LSD 5%		9	17	NS	2.4	--
# of Reps		4	4	4	4	1

Summary

None of the herbicide treatments caused any substantial wheat injury. Wild oats control was excellent with AC 222,293 and was not reduced by the addition of the sulfonyl urea herbicides. Wild oats control with diclofop or difenzoquat was lower than with AC 222.293, and in general tended to be reduced by the addition of the sulfonyl urea herbicides. Metsulfuron, DPX-M6316, and DPX-L5300 provided good Russian thistle control. Wheat yields were low due to dry conditions and generally related to weed control.

AC 222,293 herbicide combinations in wheat, Fargo, 1985. 'Marshall' hard red spring wheat was seeded April 22 in 6 inch rows in a silty clay soil with pH 7.5 and 6% organic matter. Treatments were applied on May 22 with clear sky, 67 F, 50% relative humidity, and 5 mph N wind to 3 leaf wheat, 1 to 3 leaf wild oats, and 0.5 to 1 inch wild mustard. Treatments were applied with a bicycle wheel plot sprayer delivering 8.5 gpa at 35 psi. Precipitation for a 2 week period following application was 1.69 inches. The experimental design was a randomized complete block with four replications. Crop injury and weed control was evaluated on July 22 with weed densities of 75 wild oats and 10 wild mustard plants/m^2.

Treatment	Rate	Wheat Yield	Wheat injury	Weed control Wioa	Weed control Wimu
	(oz/A)	(bu/A)	(%)	-----(%)----	
AC 222,293	6	76	0	98	99
AC 222,293	8	67	0	96	99
AC 222,293+MCPA-bee	6+4	74	1	96	99
AC 222,293+MCPA-bee	8+4	72	1	96	99
AC 222,293+2,4-D-bee	6+4	65	0	92	99
AC 222,293+2,4-D-bee	8+4	74	1	96	99
AC 222,293+bromoxynil	6+4	67	0	82	99
AC 222,293+bromoxynil	8+4	77	0	95	99
AC 222,293+brox+MCPA-bee	6+4+4	78	1	97	99
AC 222,293+brox+MCPA-bee	8+4+4	83	0	94	99
MCPA-bee	4	46	0	0	99
2,4-D-bee	4	36	0	0	99
Bromoxynil	4	42	0	0	99
Bromoxynil+MCPA-bee	4+4	41	0	0	99
Untreated	0	36	0	0	0
C.V. %		17	383	7	0
LSD 5%		15	NS	6	NS

Summary

Wheat had good tolerance to all of the herbicide treatments in the experiment. All of the treatments gave 99% wild mustard control. AC 222,293 gave 94% or greater wild oats control except when applied at 6 oz/A in combination with 2,4-D-bee or bromoxynil. Wild oats control was increased when AC 222,293 was applied at 8 compared to 6 oz/A in combination with 2,4-D-bee or bromoxynil. Herbicide treatments that controlled both wild oats and wild mustard greatly increased wheat yields compared to the untreated check or treatments where only wild mustard was controlled.

Date of wheat seeding for wild oats control, Fargo 1985. 'Len' wheat was seeded on all dates. Date 1 was seeded on April 17, Date 2 on May 3, and Date 3 on May 24. Bromoxynil at 6 oz/A was applied for wild mustard control as needed. Diclofop at 20 oz/A was applied to the Date 1 seeded wheat on May 22, to Date 2 on May 24, and to Date 3 on July 10.

Treatment	Rate	Wild oats	Wheat yield
	(oz/A)	(Plants/m2)	(Bu/A)
Diclofop Date 1	20	5	58.7
Diclofop Date 2	20	2	77.0
Diclofop Date 3	20	8	50.9
Untreated Date 1	0	57	47.9
Untreated Date 2	0	60	67.2
Untreated Date 3	0	12	49.3
HIGH MEAN		60	77.0
LOW MEAN		2	47.9
EXP MEAN		24	58.5
C.V. %		99	8.1
LSD 5%		35	7.1
LSD 1%		49	9.9
# OF REPS		4	4

Summary

Wheat yields were higher with the second date of seeding than with the other seeding dates regardless of wild oat control. Wheat yields with the second date of seeding were higher than the first date of seeding perhaps due to a longer period of wild oat competition prior to herbicide treatment. Chemical wild oat control increased wheat yields approximately 10 bu/A in both the first and second dates of wheat seeding. Chemical wild oat control in the third date of seeding did not result in higher wheat yields due to wild oat control from tillage prior to wheat seeding. Wheat yields with an early seeding date exceed yields with a late seeding date when wild oats are controlled. Wheat yields are equal for early and late dates of seeding with no wild oat control even though wild oat populations are lower with late date of seeding. Thus, the late wild oats are either more competitive or potential yeild is lower with late seeding.

Postemergence wild oats and wild mustard control, Fargo, 1985. 'Marshall' Hard Red Spring wheat was seeded April 19. Early postemergence treatments(2-3lf) were applied to 1 to 3 leaf wild oats, 2 inch wild mustard, and 3 leaf wheat with 45F, 75% relative humidity, and sunny skies on May 15. Late postemergence treatments(3-5lf) were applied to 5 leaf wild oats and wheat, and 4 to 6 inch wild mustard with 65F and 70% relative humidity on May 28. Wheat injury and weed control were evaluated August 1.

Treatment	Rate	Wild oats	Wild mustard	Wheat Injury	Wheat Yield
	(oz/A)	-(% control)-		(%)	(Bu/A)
Fenoxaprop(2-3lf)	1.5	60	0	1	58.3
Fenoxaprop(2-3lf)	2	76	0	3	57.4
Fenoxaprop(2-3lf)	2.5	76	0	5	52.7
Fenoxaprop(2-3lf)	5	93	0	9	59.4
HOE7115-02H(2-3lf)	2.25	87	98	9	72.9
HOE7115-02H(2-3lf)	3	93	99	10	75.3
HOE7115-02H(2-3lf)	6	98	99	12	72.2
HOE7115-01H(2-3lf)	2.25	96	99	13	65.1
HOE7115-01H(2-3lf)	3	96	99	13	53.8
HOE7115-01H(2-3lf)	6	99	99	13	61.3
HOE7117-01H(2-3lf)	2.5	93	99	12	69.3
HOE7117-01H(2-3lf)	3	92	99	11	70.8
HOE7117-02H(2-3lf)	2.5	90	99	6	74.7
HOE7117-02H(2-3lf)	3	95	99	11	68.5
AC222293(2-3lf)	6	90	99	3	61.1
Untreated(2-3lf)	0	0	0	0	61.4
Fenoxaprop(3-5lf)	1.5	95	0	15	61.6
Fenoxaprop(3-5lf)	2	96	0	26	49.6
Fenoxaprop(3-5lf)	2.5	97	0	28	59.2
Fenoxaprop(3-5lf)	5	99	0	41	66.3
HOE7115-02H(3-5lf)	2.25	99	99	25	56.1
HOE7115-02H(3-5lf)	3	99	99	34	60.5
HOE7115-02H(3-5lf)	6	99	99	38	54.0
HOE7115-01H(3-5lf)	2.25	98	99	25	59.7
HOE7115-01H(3-5lf)	3	99	99	31	57.4
HOE7115-01H(3-5lf)	6	99	99	30	40.3
HOE7117-01H(3-5lf)	2.5	99	99	34	58.6
HOE7117-01H(3-5lf)	3	98	99	28	54.0
HOE7117-02H(3-5lf)	2.5	99	99	28	59.1
HOE7117-02H(3-5lf)	3	99	99	29	56.9
AC222293(3-5lf)	6	88	99	0	40.4
Untreated(3-5lf)	0	0	0	0	43.8
C.V. %		5	1	36	21.4
LSD 5%		6	0	9	17.9
Additional Treatments					
HOE171-05H(2-3lf)	2.5	98	0	4	
HOE171-05H(2-3lf)	5	99	0	14	
HOE171-05H(3-5lf)	2.5	99	0	60	
HOE171-05H(3-5lf)	5	99	0	65	

Summary

Wild oats control with fenoxaprop was higher with the late application than with the early application. Fenoxaprop and all HOE compounds caused wheat injury which was more severe with the late treatments. AC 222,293 gave good control of wild mustard and wild oats with no wheat injury. Wheat yields generally related to weed control and/or wheat injury.

Postemergence wild oats and wild mustard control in wheat, Minot, 1985. 'Coteau' Hard Red Spring wheat was seeded on May 15, 1985. Early postemergence treatments(2-3lf) were applied to 2 leaf wild oats, 2 inch wild mustard, and 2.5 leaf wheat on June 1 with 60F and 50% relative humidity. Late postemergence treatments(3-5lf) were applied to 3 to 4 leaf wild oats, 4 inch wild mustard, and 4 leaf wheat on June 10 with 70F and 50% relative humidity. The expermental design was a randomized complete block with four replications. Wheat injury and weed control were eveluated on July 16.

Treatment	Rate	Wheat Yield	Wheat Injury	Wild oats	Wild mustard
	(oz/A)	(Bu/A)	(%)	(% control)	
Fenoxaprop(2-3lf)	1.5	44.7	28	95	10
Fenoxaprop(2-3lf)	2	57.7	2	93	13
Fenoxaprop(2-3lf)	2.5	57.7	4	99	0
Fenoxaprop(2-3lf)	5	60.4	10	99	24
HOE7115-02H(2-3lf)	2.25	62.8	4	98	95
HOE7115-02H(2-3lf)	3	62.0	3	97	85
HOE7115-02H(2-3lf)	6	58.3	10	98	98
HOE7115-01H(2-3lf)	2.25	54.9	6	96	86
HOE7115-01H(2-3lf)	3	53.3	7	98	93
HOE7115-01H(2-3lf)	6	53.9	11	96	99
HOE7117-01H(2-3lf)	2.5	57.4	8	94	98
HOE7117-01H(2-3lf)	3	57.6	3	96	97
HOE7117-02H(2-3lf)	2.5	53.2	7	95	99
HOE7117-02H(2-3lf)	3	57.7	10	96	99
AC222293(2-3lf)	6	51.7	0	91	99
Fenoxaprop(3-5lf)	1.5	42.2	40	92	0
Fenoxaprop(3-5lf)	2	48.7	29	98	0
Fenoxaprop(3-5lf)	2.5	44.8	40	99	0
Fenoxaprop(3-5lf)	5	39.3	41	99	0
HOE7115-02H(3-5lf)	2.25	53.1	24	99	86
HOE7115-02H(3-5lf)	3	51.8	30	99	92
HOE7115-02H(3-5lf)	6	53.4	33	99	99
HOE7115-01H(3-5lf)	2.25	55.0	20	98	89
HOE7115-01H(3-5lf)	3	54.2	18	97	75
HOE7115-01H(3-5lf)	6	52.4	25	99	99
HOE7117-01H(3-5lf)	2.5	51.7	28	99	99
HOE7117-01H(3-5lf)	3	48.1	23	99	99
HOE7117-02H(3-5lf)	2.5	54.7	19	98	99
HOE7117-02H(3-5lf)	3	50.4	25	99	99
AC222293(3-5lf)	6	41.5	8	91	99
Untreated	0	26.8	0	0	0
C.V. %		12.8	57	2	20
LSD 5%		9.2	13	3	19

Summary

All treatments provided greater than 90% wild oats control. All HOE numbered compounds and AC 222,293 gave good control of wild mustard. Fenoxaprop and all HOE compounds caused substantial wheat injury with the late treatment. Wheat yields generally related to weed control and/or crop injury.

Time of wild oat and wild mustard control in wheat, Fargo NW22, 1985. 'Marshall' Hard Red Spring wheat was seeded on April 22. The 2 lf treatments were applied to 2 to 3 leaf wheat and wild oats, and 0 to 2 inch wild mustard on May 22 with 55F and 60% relative humidity. A second diclofop treatment was applied to the 2 lf treatments on May 28 due to late emerging wild oats. The 4 lf treatments were applied to 4 leaf wheat, 3 to 4 leaf wild oats, and 0 to 4 inch wild mustard on May 28 with 65F and 60% relative humidity. The 5 lf treatments were applied to 5 leaf wheat, 4 leaf wild oats, and 3 to 8 inch wild mustard on June 3 with 60F and 50% relative humidity. The boot treatments were applied to wheat in the early boot stage, 6 leaf to jointing wild oats, and 5 inch to flowering wild mustard on June 26 with 65F and 55% relative humidity. The experimental design was a randomized complete block with four replications. Weed control was evaluated on August 1, and weed densities were determined prior to harvest.

Treatment	Rate	Wioa	Wimu	Wioa	Wimu	Wheat Yield
	(oz/A)	(% control)		(plants/m2)		(bu/A)
Diclofop(2lf)	16	92	0	14	27	59.0
Diclofop(4lf)	20	97	0	21	23	55.8
Diclofop(5lf)	24	87	0	38	16	56.1
Diclofop(boot)	32	65	0	124	19	38.0
MCPA-bee(2lf)	6	0	98	241	0	39.6
MCPA-bee(4lf)	6	0	97	224	2	43.4
MCPA-bee(5lf)	6	0	99	238	0	33.3
MCPA-bee(boot)	6	0	98	187	9	33.6
Dicl+Brox(2lf)	16+6	91	99	26	0	71.4
Dicl+Brox(4lf)	20+6	89	99	36	0	72.1
Dicl+Brox(5lf)	24+6	84	98	87	0	59.3
Dicl+Brox(boot)	32+6	65	92	119	2	38.8
Control	0	0	0	159	11	34.9
C.V. %		12	3	46	83	19.2
LSD 5%		9	2	77	10	13.5

Summary

Diclofop controlled wild oats when applied prior to the boot stage. MCPA and bromoxynil controlled wild mustard at all application stages. Wild oats density appeared to have an influence on the wild mustard density. Wheat yields were reduced by both wild oats and wild mustard competition. Wild oats reduced wheat yields more than wild mustard probably due to higher densities. Wheat yields were highest where both wild oats and wild mustard were controlled prior to the 5 leaf stage.

<u>Time of wild oats and wild mustard control in wheat, Fargo main station, 1985.</u> 'Marshall' Hard Red Spring wheat was seeded on April 30. The 2 lf treatments were applied to 2 to 3 leaf wheat and wild oats, and 0 to 2 inch wild mustard on May 22 with 55F and 60% relative humidity. A second diclofop treatment was applied to the 2 lf treatments on May 28 due to late emerging wild oats. The 4 lf treatments were applied to 3 to 4 leaf wheat and wild oats, and 0 to 4 inch wild mustard on May 28 with 65F and 60% relative humidity. The 5 lf treatments were applied to 4 to 5 leaf wheat, 4 leaf wild oats, and 3 to 8 inch wild mustard on June 3 with 60F and 50% relative humidity. The boot treatments were applied to wheat in the early boot stage, 6 leaf to jointing wild oats, and 5 inch to flowering wild mustard on June 26 with 65F and 55% relative humidity. The experimental design was a randomized complete block with four replications. Weed control was evaluated on August 1, and weed densities were determined prior to harvest.

Treatment	Rate	Wioa	Wimu	Wioa	Wimu	Wheat Yield
	(oz/A)	(% control)		(plants/m2)		(bu/A)
Diclofop(2lf)	16	95	0	33	42	35.6
Diclofop(4lf)	20	97	0	4	104	39.7
Diclofop(5lf)	24	94	0	32	47	38.8
Diclofop(boot)	32	62	0	103	29	22.1
MCPA-bee(2lf)	6	0	98	227	1	31.5
MCPA-bee(4lf)	6	0	98	105	2	35.5
MCPA-bee(5lf)	6	0	99	254	6	30.3
MCPA-bee(boot)	6	0	97	235	22	24.3
Dicl+Brox(2lf)	16+6	93	89	27	1	75.2
Dicl+Brox(4lf)	20+6	87	99	50	0	68.5
Dicl+Brox(5lf)	24+6	93	92	63	1	63.4
Dicl+Brox(boot)	32+6	59	95	190	12	19.1
Control	0	0	0	191	31	12.9
C.V. %		13	3	47	63	17.5
LSD 5%		10	2	78	20	9.6

Summary

Diclofop controlled wild oats when applied at the 5 leaf stage or earlier. MCPA controlled wild mustard regardless of application stage. Wild oats density appeared to have an influence on wild mustard density. Wheat yields were reduced by both wild oats and wild mustard competition. Wheat yields were highest where both wild oats and wild mustard were controlled prior to the boot stage.

Postemergence broadleaf weed control in wheat, Fargo, 1985. An experiment was conducted to evaluate various postemergence herbicides for broadleaf weed control in 'Marshall' wheat seeded April 24. Treatments were applied to 5 leaf wheat, and 1 to 5 inch kochia on June 3 with 60 F, 50% relative humidity and clear skies. The experimental design was a randomized complete block design with four replications. Crop injury and weed control were evaluated June 17.

Treatment	Rate	Wheat Yield	Wheat Injury	Kochia control
	(oz/A)	(bu/A)	(%)	(%)
MCPA-bee	4	59	0	35
2,4-D-dma	4	62	4	70
2,4-D-dma	6	67	5	70
Clopyralid&2,4-D	1+4	65	0	40
Clopyralid&2,4-D	1.5+6	67	5	65
Clpyralid&2,4-D+fluroxypyr	1.5+6+2	66	3	80
Clopyralid&2,4-D+dicamba	1+4+1.25	65	4	77
Picloram+2,4-D-dma	0.25+6	64	0	79
Picloram+2,4-D+dicamba	0.25+6+1.25	68	5	85
2,4-D+dicamba	6+1.25	73	6	88
Fluroxypyr	1.5	62	4	85
Fluroxypyr	2	68	4	83
Fluroxypyr+MCPA-bee	1.5+4	79	0	85
Fluroxypyr+MCPA-bee	2+4	74	1	80
Fluroxypyr+MCPA-bee+brox	1.5+4+2	69	1	88
Fluroxypyr+MCPA-bee+brox	2+4+2	78	3	95
Bromoxynil&MCPA	8	73	1	94
Dicamba+MCPA	1.5+4	70	9	89
PPG-1013	0.16	60	16	90
PPG-1013+X-77	0.16+0.5%	59	26	92
PPG-1013	0.32	64	16	91
PPG-1013+bromoxynil	0.16+4	52	20	96
PPG-1259	1.6	62	3	50
Control	0	58	0	0
C.V. %		12	77	9
LSD 5%		11	6	9

& = formulated mixture which was 1:4 for clopyralid&2,4-D, and 1:1 for bromoxynil&MCPA.

Summary

No substantial wheat injury resulted from any treatments except for PPG-1013, which caused 16 to 26% wheat injury. Kochia control was 90% or greater with treatments containing PPG-1013 or bromoxynil. Fluroxypyr at 2 oz/A provided 85% kochia control. Addition of MCPA-bee to fluroxpyr did not improve kochia control. Kochia control of 40 and 50% was achieved with clopyralid and 2,4-D at 5 and 7.5 oz/A, respectively. Wheat yield generally related to weed control and/or crop injury.

Weed control in wheat, Williston, 1985. 'Stoa' Hard Red Spring wheat was seeded into fallowed soil on April 29. All treatments except 2,4-D were applied to 3.5 to 4 leaf wheat, 0 to 1.5 leaf green foxtail, and 4 to 6 inch Russian thistle on May 23 with 58F and 75% relative humidity. The 2,4-D treatments were applied to 5 leaf wheat, 2 to 4 leaf green foxtail, and 4 to 6 inch Russian thistle on June 3 with 54F and 69% relative humidity. The experimental design was a randomized complete block with four replications. Crop injury and weed control were evaluated on July 16.

				Wheat		
Treatment	Rate	Grft	Ruth	Inj	Yield	Tswt
	(oz/A)	(% control)		(%)	(bu/A)	
MCPA	4	0	0	0	12.3	54.3
2,4-D	4	13	65	0	10.2	54.7
2,4-D	8	4	80	0	13.2	56.5
Bromoxynil&MCPA-6E	8	33	73	0	12.7	54.9
Bromoxynil+2,4-D-bee	4+4	31	93	0	14.5	56.3
Dicamba+MCPA-dma	1.5+4	11	58	0	12.1	55.8
Picloram+2,4-D-dma	0.25+4	13	60	0	13.8	56.8
Clopyralid&2,4-D	5	19	59	0	15.6	55.4
Clopyralid&2,4-D	7.5	41	78	0	12.1	55.7
Clopyralid&2,4-D+Dicamba	5+1	5	64	0	13.8	56.2
Fluroxypyr+2,4-D-dma	1+4	18	93	0	13.1	56.0
Propanil&MCPA	19	81	46	0	13.6	55.7
AC222293+Fenoxaprop	6+1	38	74	0	16.7	57.5
AC222293+Propanil	6+18	50	68	0	13.9	54.6
AC222293+AC25295	6+0.07	30	65	20	9.2	56.5
Bentazon&MCPA	12	10	84	0	14.6	56.0
PPG-1013+X-77	0.16+0.5%	0	64	0	14.3	55.0
DPX-M6316+X-77	5+0.25%	64	96	0	15.1	56.2
DPX-L5300+X-77	3.7+0.25%	41	94	0	14.0	55.4
Metsulfuron+X-77	0.6+0.25%	39	79	0	15.1	56.3
DPX-R9674+X-77	3.7+0.25%	53	95	0	12.7	55.4
Diclofop+Bromoxynil	8+4	74	85	0	15.1	54.9
Diclofop+Bromoxynil	12+4	75	84	0	12.6	55.0
Control		0	0	0	12.8	54.0
C.V. %		73	26	173	16.8	--
LSD 5%		32	25	2	3.2	--
No. of reps		4	4	4	4	1

& = formulated mixture which was 1:1 for bromoxynil&MCPA, 1:4 for clopyralid&2,4-D, 1:0.26 for propanil&MCPA, and 2:1 for bentazon&MCPA

Summary

AC 222,293 plus AC 252,925 was the only treatment that caused wheat injury. Wheat injury was not evident from the DPX numbered compounds even though they were applied at ten times the recommended use rates. Diclofop plus bromoxynil and propanil plus MCPA were the only treatments to provide more than 65% green foxtail control. The DPX numbered compounds, bromoxynil plus 2,4-D, and fluroxypyr plus 2,4-D provided greater than 90% Russian thistle control. Wheat yields were low due to dry conditions.

Weed control in wheat, Minot, 1985. 'Len' Hard Red Spring wheat was seeded on May 17. Treatments were applied to 4.5 to 5.0 leaf wheat and 4 to 6 leaf volunteer sunflower on June 14 with 60F and 65% relative humidity. All treatments were applied with a bicycle wheel type plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with three replications. Crop injury and weed control were evaluated on July 17.

Treatment	Rate	Wheat				Cosf
		Inj	Ht	Tswt	Yld	
	(oz/A)	(%)	(cm)		(bu/A)	(%)
MCPA	4	2	76	60	61.5	88
2,4-D	4	2	71	61	50.9	88
2,4-D	8	3	71	60	50.8	85
Brox&MCPA	8	2	72	60	62.2	93
Bromoxynil+2,4-D-bee	4+4	2	70	61	57.8	98
Dicamba+MCPA-dma	1.5+4	0	73	60	59.8	99
Picloram+2,4-D-dma	0.25+4	2	72	61	55.6	88
Clopyralid&2,4-D	5	3	76	59	58.4	99
Clopyralid&2,4-D	7.5	2	70	60	63.2	98
Clopyralid&2,4-D+Dica	5+1	2	73	60	58.8	97
Flox+2,4-D-dma	1+4	7	70	60	60.4	96
Propanil&MCPA	19	12	71	60	58.5	90
AC 222,293+Fenoxaprop	6+1	7	69	60	52.0	60
AC 222,293+Propanil	6+18	13	70	60	57.1	80
AC 222,293+AC 252925	6+0.07	60	54	55	20.8	73
Bentazon&MCPA	12	0	72	60	65.5	94
PPG-1013+X-77	0.16+.5%	10	71	60	52.0	57
DPX-M6316+X-77	0.5+.25%	3	73	61	65.6	99
DPX-L5300+X-77	0.37+.25%	2	75	59	68.5	99
Metsulfuron+X-77	0.06+.25%	6	75	58	61.6	99
DPX-R9674+X-77	0.37+.25%	1	71	59	61.7	99
Diclofop+Bromoxynil	8+4	8	76	60	65.9	96
Diclofop+Bromoxynil	12+4	0	73	58	61.3	99
Control	0	0	78	59	57.1	0
C.V. %		86	7	3	12.0	15
LSD 5%		9	8	3	11.4	21

Summary

PPG-1013 applied alone and propanil applied in combination with MCPA or AC 222,293 caused 11% or greater wheat injury. AC 252,925 plus AC 222,293 caused 60% injury. All treatments except PPG-1013 and those including AC 222,293 provided 88% or greater volunteer sunflower control. Wheat yields generally related to crop injury.

Weed control in wheat, Langdon, 1985. 'Crosby' durum wheat was seeded on April 29. Treatments were applied to 4 to 5 leaf wheat on June 10 with 60F and 65% relative humidity. Weed densities were light and variable. The experimental design was a randomized complete block with four replications. Weed control and wheat injury were evaluated on July 25.

Treatment	Rate (oz/A)	Wheat inj (%)	Wibu	Coma	Fipc	Grft	Wheat Tswt	Wheat Yield (Bu/A)
			----(% control)----					
MCPA	4	0	0	5	98	0	60.5	56.1
2,4-D	4	3	53	49	90	8	61.0	61.1
2,4-D	8	1	41	44	97	0	61.0	56.4
Brox&MCPA	8	1	99	73	99	0	60.0	53.9
Brox+2,4-D-bee	4+4	0	66	69	93	0	61.0	53.9
Dicamba+MCPA-dma	1.5+4	0	68	38	94	0	61.5	64.8
Picl+2,4-D-dma	0.25+4	0	98	51	90	0	61.5	61.7
Clopyralid&2,4-D	5	0	99	40	81	0	61.0	56.1
Clopyralid&2,4-D	7.5	4	99	55	86	0	61.5	59.2
Clop&2,4-D+Dica	5+1	3	99	46	85	0	62.0	53.9
Flox+2,4-D-dma	1+4	1	96	49	79	0	61.0	54.6
Propanil&MCPA	19	11	98	56	99	93	61.5	55.8
AC293+Fenoxaprop	6+1	3	94	66	99	0	61.0	49.3
AC293+Propanil	6+18	13	73	73	99	80	60.5	53.6
AC293+AC-252925	6+0.07	6	47	53	99	40	61.0	56.1
Bentazon&MCPA	12	0	20	43	96	0	61.0	62.0
PPG-1013+S	1.6+0.5%	11	53	57	92	15	60.5	54.9
DPX-M6316+S	5+0.25%	5	99	99	99	95	60.5	61.1
DPX-L5300+S	3.7+0.25%	28	94	99	99	99	61.0	56.1
Metsulfuron+S	0.6+0.25%	25	99	98	99	99	61.0	55.5
DPX-R9674+S	3.7+0.25%	20	99	99	99	75	61.0	57.7
Diclofop+Brox	8+4	3	99	71	99	92	61.5	61.7
Diclofop+Brox	12+4	0	99	71	98	99	61.0	55.5
Control	0	0	0	0	0	0	61.5	51.2
C.V. %		85	29	45	9	46	--	11.6
LSD 5%		7	35	37	11	32	--	NS
# of Reps		4	3	4	4	2	1	4

S = X-77 surfactant

Summary

Propanil applied in combination with MCPA or AC 222,293 caused 11 and 13% injury respectively. DPX-L5300, DPX-R9674, and metsulfuron caused 20% or greater wheat injury, however these compounds in addition to PPG-1013 and DPX-M6316 were applied at ten times the normal use rate. DPX-M6316, DPX-L5300, metsulfuron, and DPX-R9674 provided good control of all weed species evaluated. Several treatments gave excellent wild buckwheat and field pennycress control. Treatments including propanil, diclofop or the DPX compounds were the only treatments to provide good green foxtail control. Durum yields were not different, probably due to low weed densities.

Broadleaf weed control in wheat, Casselton, 1985. 'Era' wheat seeded April 19. Treatments were applied on May 23 (S1) to 4 to 5 leaf wheat, 2 to 4 leaf wild mustard, and 2 leaf volunteer sunflower, or on June 3 (S2) to 6 leaf wheat, 2 leaf to flowering wild mustard, and 2 to 6 leaf volunteer sunflower. Precipitation for a 2 week period following the S1 and S2 treatments was 1.14 and 1.52 inches, respectively. The experiment was a randomized complete block design with four replications and experimental units were 10 by 30 ft. Wheat injury and weed control were evaluated on June 27, 1985.

Treatment	Rate	Wheat Yield	Wheat injury	Weed Control Wimu	Weed Control Cosf
	(oz/A)	(bu/A)	(%)	-----(%)-----	
Fluorochloridone (S1)	2	43	1	96	21
Fluorochloridone (S1)	4	40	3	99	60
Fluo+dicamba (S1)	1+1	45	1	94	99
Fluo+dicamba (S1)	2+1	52	1	99	99
Fluo+bromoxynil (S1)	2+2	51	1	99	96
Fluo+bromoxynil (S1)	1+4	52	1	99	98
Dicamba+MCPA-dma (S1)	1.5+4	61	0	99	99
SC-0051 (S1)	4	56	8	76	98
SC-0051 (S1)	8	36	15	77	95
SC-0051 (S1)	16	41	25	89	99
Bentazon&MCPA (S1)	8+4	51	1	98	86
Bromoxynil (S1)	4	50	3	84	99
Bromoxynil&MCPA-bee(S1)	4+4	47	0	99	96
Bromoxynil+2,4-D-bee(S1)	4+4	54	4	99	97
2,4-D-bee (S1)	8	51	1	99	98
Bromoxynil+2,4-D-bee(S2)	4+4	54	1	99	95
2,4-D-bee (S2)	4	41	1	99	90
2,4-D-bee (S2)	8	41	0	99	93
Control	0	41	0	0	0
C.V. %		22	303	9	6
LSD 5%		NS	NS	12	7

& = formulated mixture which was 2:1 for bentazon&MCPA, and 1:1 for bromoxynil&MCPA

Summary

No important wheat injury occurred from any treatments except SC-0051. SC-0051 did not form a stable emulsion, and thus severe injury occurred where the treatments were first applied, but injury was not consistent across all replications. Wild mustard control was 94% or greater with all treatments except SC-0051 and bromoxynil. Volunteer sunflower control was excellent with all treatments except bentazon plus MCPA or fluorochloridone. Fluorochloridone at 2 and 4 oz/A provided 21 and 60% volunteer sunflower control, respectively. Due to unusually wet conditions variable weed and crop growth resulted in variable wheat yields.

<u>Postemergence herbicides in wheat, Fargo, 1985.</u> Several postemergence herbicides were evaluated for weed control in 'Marshall' Hard Red Spring wheat seeded April 24. Treatments were applied to 5 leaf wheat, 4 to 8 leaf wild mustard, 2 to 6 leaf volunteer sunflower, and 1 to 5 inch kochia on June 3 with 60 F and 50% relative humidity. The experimental design was a randomized complete block with four replications. Crop injury and weed control were evaluated on June 18, 1985.

Treatment	Rate	Wheat Yield	Wheat Injury	Weed Control KOCZ	Weed Control Wimu	Weed Control Cosf
	(oz/A)	(bu/A)	(%)	-----(%	control)----	
BAS-14001H	8	55	4	81	98	97
BAS-14107H	16	63	0	88	99	98
BAS-04408H	16	64	8	93	98	85
BAS-04408H	32	69	8	96	98	90
BAS-03701H	20	69	1	95	97	90
BAS-03701H	40	75	4	90	99	85
Bentazon&MCPA	8+4	61	0	64	99	93
Bromoxynil	4	63	0	90	98	99
Bromoxynil&MCPA	4+4	62	0	90	99	99
MCPA-dma	4	59	0	60	96	95
DPX-M6316+X-77	0.12+0.25%	52	1	76	95	97
DPX-M6316+X-77	0.25+0.25%	65	4	71	91	98
DPX-M6316+X-77	0.5+0.25%	68	3	75	97	98
DPX-L5300+X-77	0.06+0.25%	66	0	84	96	83
DPX-L5300+X-77	0.12+0.25%	70	1	78	97	91
DPX-L5300+X-77	0.25+0.25%	60	5	91	96	92
DPX-R9674+X-77	0.20+0.25%	64	3	74	94	97
DPX-R9674+X-77	0.25+0.25%	67	3	92	99	98
DPX-R9674+X-77	0.37+0.25%	71	4	87	98	99
DPX-E8698+X-77	0.25+0.25%	71	6	84	96	98
DPX-E8698+X-77	0.5+0.25%	61	6	85	98	96
DPX-R9521+X-77	0.14+0.25%	68	5	88	98	99
DPX-R9521+X-77	0.28+0.25%	62	9	93	99	99
DPX-T6376+X-77	0.03+0.25%	68	3	78	97	99
DPX-T6376+X-77	0.06+0.25%	68	1	82	98	99
Control	0	59	0	0	0	0
C.V. %		17	118	11	3	7
LSD 5%		NS	5	12	5	8

& = formulated mixture which was 2:1 for bentazon&MCPA, 1:1 for bromoxynil&MCPA

Summary

Most of the numbered BAS and DPX compounds caused less than 10% wheat injury. Wild mustard control was 90% or greater with all treatments. Volunteer sunflower control was 90% or greater with all treatments except BAS-04408H at 16 oz/A and DPX-L5300 at 0.06 oz/A which provided 85 and 83% control, respectively. BAS-04408H, BAS-03701H, and bromoxynil gave 90% or greater kochia control at all rates. Kochia control of 87% or greater was achieved with the highest rates of BAS-14001H, DPX-L5300, DPX-R9674, and DPX-R9521. Excess moisture caused variability in weed and crop growth, which resulted in variable wheat yields.

Postemergence weed control in wheat, Fargo, 1985. 'Marshall' Hard Red Spring wheat was seeded May 24. Treatments were applied to 4 leaf wheat, 3 leaf green foxtail, and 1 to 2 inch kochia on June 19 with 80F, 50% relative humidity, and clear skies. Weed populations were light and variable. The experimental design was a randomized complete block with four replications and 10 by 24 ft experimental units. Wheat injury and weed control were evaluated July 14.

Treatment	Rate	Wheat injury	Green foxtail	Kochia
	(oz/A)	(%)	----(% control)---	
BAS-14001H	8	3	20	95
BAS-14107H	16	1	13	86
BAS-04408H	16	0	0	96
BAS-04408H	32	1	23	99
BAS-03701H	20	0	10	97
BAS-03701H	40	1	50	99
Bentazon&MCPA	8+4	0	0	85
Bromoxynil	4	0	3	95
Brox&MCPA-6E	4+4	0	5	89
MCPA-dma	4	0	0	29
Control	0	0	0	2
HIGH MEAN		20	50	99
LOW MEAN		0	0	2
EXP MEAN		2	11	79
C.V. %		525	133	9
LSD 5%		NS	21	10
LSD 1%		NS	29	13
# OF REPS		4	4	4

& = formulated mixture which was 2:1 for bentazon&MCPA, and 1:1 for bromoxynil&MCPA

Summary

No treatment caused any substantial wheat injury. Green foxtail control was 50% or less with all treatments. All treatments except MCPA provided 85% or greater kochia control.

Isoxaben for wild mustard control in wheat, Minot, 1985. Treatments were applied, field cultivator incorporated, and 'Len' wheat seeded on May 17, 1985. Evaluations were June 14 and July 3. Wheat was harvested September 4. The experiment was a randomized complete block with four replications and experimental units were 10 by 16 ft.

Treatment	Rate	Wild mustard 6/14	Wild mustard 7/3	Wheat Strd	Wheat Yield
	(lb/A)	-(% control)-		(%)	(bu/A)
Isoxaben	0.044	99	91	0	60
Isoxaben	0.066	98	96	0	61
Isoxaben	0.088	100	100	0	61
Isoxaben	0.132	100	100	0	62
Isoxaben	0.176	100	100	3	64
Trifluralin	0.5	4	0	25	56
Trifluralin	0.75	8	0	54	50
Control		0	0	0	62
LSD (0.05)		3	6	5	4

Summary

All rates of isoxaben controlled wild mustard without reducing wheat stand or yield. Trifluralin at 0.5 and 0.75 lb/A significantly reduced wheat stand and yield.

Isoxaben in wheat, Williston, 1985. Preplant incorporated(PPI) treatments were applied, Glenco incorporated twice, and 'Stoa' Hard Red Spring wheat was seeded on May 6. Postemergence(P) treatments were applied to 4.5 leaf wheat, 3.5 leaf green foxtail, 2 inch Russian thistle, and 0 to 2 inch wild mustard on June 4 with 63F and 60% relative humidity. The experimental design was a randomized complete block with four replications. Crop injury and weed control were evaluated on July 12.

Treatment	Rate	Wimu	Ruth	Wheat Injury	Wheat Yield	Wheat Tswt
	(oz/A)	(% control)		(%)	(bu/A)	
Isoxaben(PPI)	0.7	96	25	0	12	58.4
Isoxaben(PPI)	1.1	98	40	0	12	58.0
Isoxaben(PPI)	1.4	95	35	0	12	58.3
Isoxaben(PPI)	2.1	99	56	0	13	58.1
Isoxaben(PPI)	2.8	99	55	0	8	58.0
2,4-D(P)	4	99	96	0	13	58.5
Bromoxynil&MCPA	4	99	97	0	13	58.5
Untreated	0	0	0	0	9	57.8
C.V. %		3	45	0	24	--
LSD 5%		4	33	NS	NS	--
# of Reps		4	4	4	4	1

Summary

None of the treatments caused any wheat injury. Wild mustard control was excellent with all treatments. Russian thistle control was excellent with the postemergence treatments, but did not exceed 60% with isoxaben treatments. Wheat yields were low due to dry conditions.

<u>Foxtail control in wheat, Fargo, 1985.</u> 'Marshall' Hard Red Spring wheat was seeded on May 24. Treatments were applied on June 19 with 70F, 60% relative humidity, and clear skies to 4 leaf wheat, 3 leaf green foxtail, 2-4 leaf wild mustard, and 2 leaf redroot pigweed. Weed densities were light and variable. The experimental design was a randomized complete block with 4 replications and 10 by 24 ft experimental units. Crop injury and weed control were evaluated July 14.

Treatment	Rate	Wheat Injury	Wheat Yield	Weed control Grft	Weed control Wimu	Weed control KOCZ
	(oz/A)	(%)	(Bu/A)	--------(%)-------		
AC-293+AC-252925	6+0.04	76	7.0	88	99	99
AC-293+AC-252925	6+0.008	0	54.6	23	99	91
AC-293+AC-252925	6+0.0008	1	52.7	28	99	58
AC-293+AC-252925	8+0.04	91	1.1	88	99	95
AC-293+AC-252925	8+0.008	1	48.5	11	99	33
AC-293+AC-252925	8+0.0008	0	50.4	20	99	57
AC-252925	0.04	10	45.6	30	99	27
AC-252925	0.008	0	47.7	0	13	17
AC-252925	0.0008	0	49.2	11	13	0
AC-293	6	0	48.0	0	99	43
AC-293+Sethoxydim	6+0.03	1	47.4	38	99	20
AC-293+Propanil	6+18	4	42.0	69	99	86
AC-293+Prnl&MCPA	6+15+4	9	41.5	80	99	88
AC-293+Fenoxaprop	6+1	1	50.2	68	99	45
AC-293+Feno+PO	6+1+0.25G	0	47.1	71	99	33
Propanil&MCPA	15+4	3	44.5	44	99	80
Propanil&MCPA	18+5	3	46.0	84	99	98
Propanil+MCPA	18+4	5	43.1	78	99	93
SAN-567	12	2	46.9	81	99	95
SAN-567	18	7	43.8	90	99	94
SAN-567	24	10	47.9	85	99	96
Diclofop	8	0	49.0	71	0	0
Diclofop	12	0	50.2	83	0	0
Diclofop+Brox	8+4	0	48.1	80	99	87
Diclofop+PO	8+0.25G	0	45.1	83	0	0
No Treatment		0	49.1	0	0	0
C.V. %		45	10.7	26	8	43
LSD 5%		5	6.6	19	11	39
# OF REPS		4	4	4	3	3

Summary

AC 252,925 at 0.04 oz/A applied in combination with AC 222,293 caused 75% or greater wheat injury and some stand reduction. Wild mustard control was excellent with all treatments except for diclofop applied alone, or AC 252,925 at 0.008 and 0.0008 oz/A. Kochia control was 80% or greater with AC 222,293 plus AC 252,925 at the higher rates,and with treatments including SAN-567, bromoxynil, or propanil. Green foxtail control was adequate with diclofop and SAN-567 treatments. Wheat yields were similar for all treatments except where severe injury occurred.

Winter wheat response to fall herbicides, Minot, 1984-1985. 'Norstar' winter wheat was seeded in the fall of 1984. Treatments were applied to 3 leaf winter wheat on October 25, 1984 with 30F, 50% relative humidity and cloudy skies. Treatments were applied with a bicycle wheel type plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block design with four replications. Crop injury was evaluated on July 17. No weed control evaluations were taken due to sparse weed populations. Wheat was harvested on August 6, 1985.

Treatment	Rate	Wheat		
		Injury	Tswt	Yield
	(oz/A)	(%)	(lb/bu)	(bu/A)
2,4-D-DMA	8	10	59.5	44.8
2,4-D-BEE	8	16	59.4	44.3
MCPA-DMA	8	8	59.4	41.1
MCPA-BEE	8	13	59.8	41.1
Dicamba+MCPA-DMA	2+4	8	59.9	44.4
Bromoxynil	8	9	60.0	39.6
Bromoxynil+MCPA-DMA	6+6	11	59.7	41.7
Clopyralid+MCPA-DMA	1+6	5	59.5	42.8
No treatment	0	0	59.5	46.1
C.V. %		90	0.8	6.6
LSD 5%		NS	NS	NS

Summary

All treatments caused slight injury to the wheat. No differences in test weight or wheat yield occurred, probably due to lack of weed competition.

Response of 'Len' and 'Marshall' HRSW to picloram and phenoxy herbicide combinations, Minot, 1985. 'Len' and 'Marshall' (Mar.) Hard Red Spring wheat were seeded in a Williams loam soil, pH 6.3, with 4.0% organic matter on May 17. All treatments were applied with a bicycle-wheel plot sprayer delivering 8.5 gpa at 35 psi. Treatments were applied to 3 leaf wheat on June 5, to 5 leaf wheat on June 14, and to boot stage wheat on June 30. Wheat injury evaluations were July 26. Wheat was harvested September 4. The experiment was a randomized complete block with a split block arrangement (blocked by variety) with four replications. Experimental units were 10 by 16 ft.

Treatment	Rate	Yield			Injury			Height		
		Mar	Len	x	Mar	Len	x	Mar	Len	x
	(oz/A)	--(bu/A)--			----(%)---			---(cm)---		
Picloram+2,4-D(3lf)	0.25+4	68	62	65	0	2	1	67	72	70
Picloram+2,4-D(3lf)	0.37+6	71	62	67	5	2	4	72	75	74
Picloram+2,4-D(3lf)	0.50+12	64	61	62	10	2	6	67	75	71
Picloram+MCPA(3lf)	0.25+4	66	64	65	1	1	1	68	78	73
Picloram+MCPA(3lf)	0.37+6	62	64	63	2	2	2	67	77	72
Picloram+MCPA(3lf)	0.50+12	63	62	63	14	2	8	67	77	72
Bromoxynil+MCPA(3lf)	4+4	69	61	65	1	4	2	70	76	73
Picloram+2,4-D(5lf)	0.37+4	69	63	66	1	4	2	67	74	70
Picloram+2,4-D(5lf)	0.50+6	66	63	64	7	1	4	66	77	72
Picloram+2,4-D(5lf)	1.00+12	64	59	62	14	7	11	65	70	68
Picloram+MCPA(5lf)	0.37+4	65	61	63	5	0	2	66	77	71
Picloram+MCPA(5lf)	0.50+6	68	63	65	10	0	5	65	76	71
Picloram+MCPA(5lf)	1.00+12	56	62	59	26	5	16	62	75	69
Bromoxynil+MCPA(5lf)	4+4	69	65	67	1	1	1	71	78	75
Picloram+2,4-D(bt)	0.25+4	68	63	65	9	2	6	65	79	72
Picloram+2,4-D(bt)	0.37+6	60	56	58	16	8	12	62	72	67
Picloram+2,4-D(bt)	0.50+12	56	60	58	27	19	23	60	73	67
Picloram+MCPA(bt)	0.25+4	64	57	60	15	5	10	64	68	66
Picloram+MCPA(bt)	0.37+6	59	61	60	20	9	14	58	69	64
Picloram+MCPA(bt)	0.50+12	50	64	57	34	17	26	57	72	64
Control		67	64	66	0	0	0	72	77	75
	x	64	62		10	5		66	75	
LSD 5%	Variety		NS			2			3	
	Treatment		5			4			3	
	Variety x Treatment		7			6			5	

2,4-D = 2,4-D amine, MCPA = MCPA ester

Summary

Picloram plus phenoxy treatments were more injurious to Marshall wheat than to Len wheat. Picloram at 1.0 oz/A in combination with MCPA applied at the 5 leaf stage and picloram at 0.37 and 0.50 oz/A in combination with 2,4-D or MCPA applied at the boot stage significantly reduced Marshall wheat height. Picloram + MCPA only when applied at the boot stage reduced Len wheat height compared to the untreated Len wheat. Len wheat yield was not significantly reduced by herbicide treatments.

Response of 'Lloyd' durum to sulfonyl urea herbicides, Minot, 1985. 'Lloyd' durum was seeded in a Williams loam soil, pH 7.3, with 4% organic matter ND on May 3. Treatments were applied with a bicycle-wheel plot sprayer delivering 8.5 gpa at 35 psi to 2.2 to 2.8 leaf durum (S1), 4.5 to 4.8 leaf durum in the mid-tiller stage(S2), and 6.5 leaf durum in the late-tiller stage (S3) on May 22, June 3, and June 10, respectively. Sulfonyl urea herbicides were applied with X-77 at 0.5% v/v. Durum injury was evaluated June 19 and August 2. Durum was harvested August 22. The experiment was a randomized complete block with four replications and experimental units were 10 by 20 ft.

Treatment	Rate	Injury 6/19	Injury 8/2	Heading date	Durum Height	Durum Yield
	(oz/A)	----(%)----		June	(cm)	(bu/A)
DPX-M6316	0.38	0	0	5	67	59
DPX-M6316	1.0	0	0	5	65	60
DPX-L5300	0.25	0	0	5	64	60
DPX-L5300	1.0	0	1	5	66	66
DPX-T6376	0.06	1	3	5	62	60
DPX-T6376	0.13	1	3	5	65	65
Bromoxynil	4	0	0	5	66	59
Bromoxynil+MCPA	4+4	0	0	5	63	61
DPX-M6316	0.38	0	1	5	66	64
DPX-M6316	1.0	1	4	5	65	66
DPX-L5300	0.25	5	9	6	66	60
DPX-L5300	1.0	6	10	6	64	60
DPX-T6376	0.06	5	10	6	64	67
DPX-T6376	0.13	11	13	6	64	60
Bromoxynil	4	0	0	5	63	60
Bromoxynil+MCPA	4+4	0	0	5	66	63
DPX-M6316	0.38	0	1	5	63	60
DPX-M6316	1.0	0	3	5	66	61
DPX-L5300	0.25	6	13	6	62	58
DPX-L5300	1.0	12	23	6	61	59
DPX-T6376	0.06	11	18	6	59	58
DPX-T6376	0.13	13	23	7	62	57
Bromoxynil	4	0	1	5	67	64
Bromoxynil+MCPA	4+4	0	1	5	67	63
Control		0	0	5	64	65
LSD (0.05)		2	4	0.4	4	NS

Summary

DPX-L5300 and DPX-T6376 applied to late-tillered durum significantly injured the durum, but only tended to reduce durum yield. The experimental area did not contain enough weeds for evaluation so the data represent the response of weed-free wheat to the various treatments.

Wheat response to fallow treatments, Fargo, Minot, and Williston, 1983-1985. Fall(F) herbicide treatments were applied to standing wheat stubble on November 11, October 26, and October 25, 1983, and spring(S) treatments were applied on May 29 and 26, and June 5, 1984, at Fargo, Minot, and Williston, respectively. The plot areas were fallowed in 1984, and seeded to Hard Red Spring wheat in the spring of 1985. Wheat injury and wild mustard control were evaluated on Fargo on July 10.

Treatment	Rate	Fargo Wheat	Fargo Wild mustard
	(lb/A)	(% Strd)	(% control)
Cyanazine+atrazine(F)	2.5+0.5	0	75
Cyanazine+R40244(F)	2.5+0.5	15	72
Cyanazine+metribuzin(F)	2.5+0.5	17	60
Metr+paraquat+metr+S(F)	0.5+0.5+0.37	0	29
Chlorsulfuron(F)	0.015	27	60
Chlorsulfuron(F)	0.03	7	98
Metsulfuron(F)	0.0075	7	52
Metsulfuron(F)	0.015	0	73
Metsulfuron(F)	0.0225	5	94
Clsu(F)+glyphosate+S(S)	0.015+0.25	2	90
Mets(F)+glyphosate+S(S)	0.015+0.25	3	77
Hexazinone+clsu(F)	0.5+0.015	25	87
Hexazinone+R40244(F)	0.5+0.5	7	92
R40244(F)+Sulphosate(S)	0.5+0.25	12	68
Buthidazole+metr(F)	0.5+0.5	7	17
Metribuzin+R40244(F)	0.5+0.5	3	42
Paraquat+cyanazine+S(S)	0.5+2	2	55
Paraquat+metribuzin+S(S)	0.5+0.5	1	13
Paraquat+clsu+S(S)	0.5+0.015	7	81
Paraquat+R40244+S(S)	0.5+0.5	3	37
Glyphosate+clsu+S(S)	0.25+0.015	25	73
Glyp+Metsulfuron+S(S)	0.25+0.015	10	69
Glyp+R40244+S(S)	0.25+0.5	23	60
Sulphosate+clsu+S(S)	0.25+0.015	12	48
Sulphosate+R40244(S)	0.25+0.5	12	47
Pend(F)/glyp+dicl+S(S)	1.5/0.25+0.25	0	0
Glyp+pend+dicl+S(S)	0.25+1.5+0.25	0	0
C.V. %		91	35
LSD 5%		12	32

S = X-77 surfactant applied at 0.5% v/v

Summary

No wheat stand reductions were evident in any of the plots at Minot or Williston. Several of the treatments caused some wheat stand reductions at Fargo. Chlorsulfuron tended to reduce wheat stands more than metsulfuron. Most treatments provided some wild mustard control. Chlorsulfuron and metsulfuron at the highest rates and hexazinone plus R40244 provided good wild mustard control.

<u>Wheat response to spring applied fallow treatments, Minot and Williston, 1984-1985.</u> Spring chemical fallow treatments were applied to standing wheat stubble on June 5 at Minot, and on May 16 at Williston. The plot areas were fallowed for the remainder of 1984, and seeded to Hard Red Spring wheat in the spring of 1985. Plots were evaluated for wheat injury and stand reduction at early wheat maturity.

Treatment	Rate (oz/A)
Paraquat+X-77	8+0.5%
Paraquat+fluorochloridone+X-77	8+8+0.5%
Paraquat+terbutryn+X-77	4+24+0.5%
Glyphosate+X-77	4+0.5%
Glyphosate+fluorochloridone+X-77	4+8+0.5%
Glyphosate+fluorochloridone+dicamba+X-77	4+8+2+0.5%
Glyphosate+fluorochloridone+metribuzin+X-77	4+8+8+0.5%
Glyphosate+terbutryn+X-77	4+24+0.5%
Sulphosate	4
Sulphosate+fluorochloridone	4+8
Sulphosate+fluorochloridone+dicamba	4+8+2
Sulphosate+fluorochloridone+metribuzin	4+8+8
Sulphosate+terbutryn	4+24
Terbutryn+X-77	24+0.5%
Terbutryn+fluorochloridone+X-77	24+8+0.5%
Terbutryn+metribuzin+X-77	24+8+0.5%

Summary

None of the herbicide treatments caused any visible wheat injury or stand reductions.

Herbicides applied in the fall and spring for weed control in fallow, Fargo, 1984-1985. Treatments were applied in standing wheat stubble with 1500 lb/A residue. Fall treatments(F) were applied on October 18, and spring treatments(S) were applied on May 22. Precipitation for a two week period following spring application was 1.69 inches. The experimental design was a randomized complete block with four replications. Weed control was evaluated on July 10.

Treatment	Rate	Weed control			
		Wioa	KOCZ	Wimu	Yeft
	(oz/A)	------------(%)------------			
Cyanazine+atrazine(F)	40+8	62	98	97	59
Cyanazine+metribuzin(F)	40+8	60	96	98	53
Cyanazine+fluorochloridone(F)	40+8	25	99	99	49
Terbutryn+atrazine(F)	32+8	50	90	86	60
Terbutryn+metribuzin(F)	32+8	65	90	95	66
Buthidazole+metribuzin(F)	8+8	46	91	99	65
Metr(F)/paraquat+metr+S(S)	8/8+6	76	99	99	89
Chlorsulfuron(F)/glyp+S(S)	0.25+4	61	97	99	69
Fluo+metribuzin(F)	8+8	16	86	99	26
Fluo+hexazinone(F)	8+8	50	85	98	60
Fluo(F)/sulphosate	8+4	38	96	97	39
Imazaquin	4	51	66	97	75
Imazaquin	6	70	92	99	90
Pendimethalin+Fluo(F)	24+8	5	93	98	39
Metsulfuron+glyphosate+S(S)	0.06+4	67	91	99	49
Metsulfuron+glyphosate+S(S)	0.125+4	68	98	99	73
Chlorsulfuron+glyp+S(S)	0.25+4	55	99	99	75
Mets+glyp&2,4-D&S(S)	0.06+11	58	86	99	61
FMC-57020+glyphosate+S(S)	16+4	99	98	98	99
FMC-57020+glyphosate+S(S)	20+4	98	97	97	99
FMC-57020+glyphosate+S(S)	24+4	99	98	92	99
FMC-57020+clsu+glyp+S(S)	16+0.25+4	99	99	99	99
Imazaquin+glyphosate+S(S)	4+4	87	88	99	95
Metsulfuron+sulphosate+S(S)	0.06+4	63	85	96	61
Clsu+sulphosate+S(S)	0.25+4	56	93	99	91
Glyphosate+terb+metr+S(S)	4+24+8	60	98	99	83
Terbutryn+metribuzin+S(S)	24+8	75	99	99	91
Halo+PO(S)/2,4-D bee(S+3)	3+6	35	56	87	41
Haloxyfop+mets+PO(S)	3+0.06	80	88	98	65
C.V. %		30	10	4	23
LSD 5%		25	12	6	22

S=X-77 surfactant applied at 0.5% v/v; PO=petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

All treatments provided good wild mustard control. Kochia control was good with all treatments except imazaquin at 4 oz/A, or haloxyfop with 2,4-D. Wild oats and yellow foxtail control was highest with treatments including FMC-57020. Treatments including FMC-57020 provided greater than 90% control of all weed species evaluated.

Herbicides applied in the fall and spring for weed control in fallow, Minot, 1984-1985. Treatments were applied in standing wheat stubble with 1500 lb/A residue. Fall treatments(F) were applied on October 23, and spring treatments(S) were applied on May 29. Precipitation for a two week period following spring application was 1.81 inches. The experimental design was a randomized complete block with four replications. Weed control was evaluated on July 17.

Treatment	Rate	Weed control				
		KOCZ	Wibu	Ruth	Grft	All
	(oz/A)	(%)				
Cyanazine+atrazine(F)	40+8	92	71	74	69	59
Cyanazine+metribuzin(F)	40+8	83	76	65	64	66
Cyanazine+fluorochloridone(F)	40+8	94	74	87	80	73
Terbutryn+atrazine(F)	32+8	56	35	55	60	53
Terbutryn+metribuzin(F)	32+8	84	63	78	53	54
Buthidazole+metribuzin(F)	8+8	94	96	86	68	80
Metr(F)/paraquat+metr+S(S)	8/8+6	99	99	99	99	99
Chlorsulfuron(F)/glyp+S(S)	0.25+4	99	99	98	97	96
Fluo+metribuzin(F)	8+8	98	73	95	82	82
Fluo+hexazinone(F)	8+8	98	97	95	94	93
Fluo(F)/sulphosate	8+4	99	96	99	94	96
Imazaquin	4	99	99	99	96	97
Imazaquin	6	99	99	99	97	98
Pendimethalin+Fluo(F)	24+8	98	74	90	84	77
Metsulfuron+glyphosate+S(S)	0.06+4	97	95	98	92	96
Metsulfuron+glyphosate+S(S)	0.125+4	99	98	99	97	97
Chlorsulfuron+glyp+S(S)	0.25+4	99	99	99	99	97
Mets+glyp&2,4-D&S(S)	0.06+11	99	99	99	98	96
FMC-57020+glyphosate+S(S)	16+4	99	99	99	99	99
FMC-57020+glyphosate+S(S)	20+4	99	99	99	99	99
FMC-57020+glyphosate+S(S)	24+4	99	99	99	99	99
FMC-57020+clsu+glyp+S(S)	16+0.25+4	99	99	99	99	99
Imazaquin+glyphosate+S(S)	4+4	99	99	99	99	99
Metsulfuron+sulphosate+S(S)	0.06+4	99	97	99	98	97
Clsu+sulphosate+S(S)	0.25+4	99	98	99	97	98
Glyphosate+terb+metr+S(S)	4+24+8	99	99	99	99	98
Terbutryn+metribuzin+S(S)	24+8	99	99	99	99	98
Halo+PO(S)/2,4-D bee(S+3)	3+6	85	81	87	99	85
Haloxyfop+mets+PO(S)	3+0.06	99	83	99	99	93
Untreated		0	0	0	0	0
C.V. %		9	17	13	15	14
LSD 5%		12	21	16	18	16

S=X-77 surfactant applied at 0.5% v/v; PO=petroleum oil with 17% emulsifier applied at 1 qt/A; Additional weeds included tansy mustard, prickly lettuce, volunteer wheat, oxalis, biennial wormwood, wild oats, greenflower pepperweed,field pennycress, field bindweed, redroot pigweed, horseweed, common lambsquarters, and western salsify.

Summary

Many of the treatments provided excellent broad spectrum weed control. Spring applied treatments generally provided better weed control than the fall treatments.

Herbicides applied in the fall and spring for weed control in fallow, Williston, 1984-1985. Treatments were applied in standing wheat stubble with 1000 lb/A residue. Fall treatments(F) were applied on October 22, and spring treatments(S) were applied on May 23. Precipitation for a two week period following spring applications was 0.12 inches. The experimental design was a randomized complete block with four replications. Weed control was evaluated on July 16.

Treatment	Rate	Weed control					
		Grft	Ruth	Tumu	Tamu	KOCZ	Wesa
	(oz/A)	-------------(%)-------------					
Cyanazine+atrazine(F)	40+8	23	19	99	99	74	66
Cyanazine+metribuzin(F)	40+8	18	6	99	99	74	99
Cyan+fluorochloridone(F)	40+8	41	71	99	99	99	99
Terbutryn+atrazine(F)	32+8	35	0	50	50	42	50
Terbutryn+metribuzin(F)	32+8	4	38	99	99	99	66
Buthidazole+metribuzin(F)	8+8	28	15	99	99	99	99
Metr(F)/paraquat+metr+S(S)	8/8+6	71	92	85	85	97	99
Chlorsulfuron(F)/glyp+S(S)	0.25+4	78	97	99	99	99	99
Fluo+metribuzin(F)	8+8	45	41	99	99	99	99
Fluo+hexazinone(F)	8+8	59	69	99	99	99	99
Fluo(F)/sulphosate	8/4	64	70	97	97	97	99
Imazaquin	4	95	98	99	99	99	50
Imazaquin	6	97	99	99	99	99	80
Pendimethalin+fluo(F)	24+8	79	23	99	99	81	66
Metsulfuron+glyp+S(S)	0.06+4	70	97	99	99	99	99
Metsulfuron+glyp+S(S)	0.125+4	89	99	99	99	99	99
Chlorsulfuron+glyp+S(S)	0.25+4	85	99	99	99	99	99
Mets+glyp&2,4-D&S(S)	0.06+11	69	96	99	97	97	99
FMC-57020+glyphosate+S(S)	16+4	97	88	93	93	99	83
FMC-57020+glyphosate+S(S)	20+4	98	98	85	85	99	63
FMC-57020+glyphosate+S(S)	24+4	97	98	93	93	99	88
FMC-57020+clsu+glyp+S(S)	16+0.25+4	93	99	99	99	99	99
Imazaquin+glyphosate+S(S)	4+4	90	97	97	97	99	83
Mets+sulphosate+S(S)	0.06+4	80	99	99	99	99	99
Clsu+sulphosate+(S)	0.25+4	84	99	99	99	99	99
Glyphosate+terb+metr+S(S)	4+24+8	60	49	44	44	87	83
Terbutryn+metribuzin+S(S)	24+8	25	64	87	87	87	83
Halo+PO(S)/2,4-D bee(S+3)	3+6	94	96	96	96	99	81
Haloxyfop+mets+PO(S)	3+0.06	95	99	99	99	99	66
C.V. %		27	25	17	17	20	31
LSD 5%		25	25	22	22	26	43
Reps		4	4	4	4	4	3

S=X-77 surfactant applied at 0.5% v/v; PO=petroleum oil plus 17% emulsifier applied at 1 qt/A

Summary

All treatments except terbutryn plus atrazine, or glyphosate plus terbutryn and metribuzin gave good tumble and tanzy mustard control. Treatments including imazaquin, FMC-57020, or haloxyfop provided 90% or greater green foxtail control. Russion thistle and kochia control was good with several treatments. Western salsify control was less than 75% with all treatments. Several herbicide treatments provided good broad spectrum weed control.

Rotational crop response to sulfonylurea, Fargo 1982-85. Herbicide treatments were applied to 'Era' wheat on June 15, 1982. Since 1982 the area has only been cultivated in the long direction of the plots. In 1985 the injury symptoms appeared to vary somewhat from the precise plot area. 'Park' barley, lentils, 'Clark' flax, 'Seed tech' sunflower, 'Pioneer 3737' corn and 'Lakota' soybean were seeded as bioassay species across the plots on May 30. Percent crop reduction was estimated on July 30.

Experiment 1

Treatment	Rate	Barl	Lent	Flax	Corn	Sufl	Soyb
	(oz/A)	----------(% crop reduction)----------					
Untreated		0	0	0	0	5	0
Chlorsulfuron	0.06	0	0	1	6	1	0
Chlorsulfuron	0.12	10	6	5	8	19	1
Chlorsulfuron	0.18	1	0	0	0	4	8
Chlorsulfuron	0.25	4	35	8	33	13	18
Chlorsulfuron	0.37	5	70	28	54	28	26
Chlorsulfuron	0.50	1	15	3	10	3	0
Metsulfuron	0.10	4	0	3	11	10	9
Metsulfuron	0.25	1	5	3	8	8	5
Metsulfuron	0.50	3	20	13	20	56	33
C.V. %		121	73	105	73	107	152
LSD 5%		5	16	9	16	22	22
# of reps		4	4	4	4	4	4

Experiment 2

Treatment	Rate	Barl	Lent	Flax	Corn	Sufl	Soyb
	(oz/A)	----------(% crop reduction)----------					
Untreated	0	3	3	0	0	0	0
Untreated	0	8	3	1	3	0	0
Chlorsulfuron	0.25	0	15	28	20	24	3
Chlorsulfuron	0.50	4	60	60	74	66	54
Chlorsulfuron	0.75	1	86	69	85	81	79
Chlorsulfuron	1.00	3	89	63	81	85	72
Chlorsulfuron	1.50	5	93	90	93	94	91
Metsulfuron	0.50	3	61	20	36	50	81
Metsulfuron	1.00	6	76	41	71	71	93
C.V. %		150	30	37	27	25	26
LSD 5%		NS	23	22	20	19	20
# of reps		4	4	4	4	4	4

Summary

Three years after chlorsulfuron and metsulfuron application, residuals in the soil were injuring crops.

Chlorsulfuron soil residual from 1979, Fargo NW-22 1985. 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 May 30, 1985 and evaluated on July 30. 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	July 1980 % Stand reduction		August 1981 % Stand reduction		July 1982 % Stand reduction	
(oz/A)	Soybean	Sugarbeet	Soybean	Sugarbeet	Soybean	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	July 1983 % Stand reduction		July 1983 % injury	August 1984 % injury		July 1985 % injury	July 1985 % St.Rd.
(oz/A)	Soybean	Sugarbeet	Soybean	Soybean	Lentils	Soybean	Lentils
1	0	0	0	0	25-35	0	30
2	0	100	50-60	20-30	75-85	40	85
4	0	100	70-80	55-65	100	60	95

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 similarly in 1982 as in 1980 and 1981, 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. Soybean stand was not reduced, but had injury symptoms in 1985. 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. DPX-F6025 applied at 0.25 oz/A in 1983 adjacent to the above area caused an 80% reduction in lentil stand.

Postemergence weed control in flax, Fargo, 1985. 'Clark' flax was seeded on May 2. Treatments were applied to 3 to 5 inch flax, 1 to 5 inch kochia, and 2 to 3 leaf yellow foxtail on June 5 with 65F and 40% relative humidity. Delayed treatments(D) were applied on June 10 with 55F and 70% relative humidity. Treatments were applied with a bicycle wheel type plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with four replications. Crop injury and weed control were evaluated on June 23.

Treatment	Rate	Flax Injury	Flax Strd	KOCZ	Yeft
	(oz/A)	(%)	(%)	(% control)	
MCPA-dma+Sethoxydim+PO	4+3+0.25G	4	0	13	99
MCPA-bee+Sethoxydim+PO	4+3+0.25G	9	0	38	98
MCPA+Sethoxydim+PO	8+3+0.25G	11	0	65	98
Brox&MCPA-6E+Seth+PO	8+3+0.25G	21	1	79	98
Bromoxynil+Seth+PO	4+3+0.25G	3	0	51	98
Picloram+MCPA+Seth+PO	0.25+4+3+0.25G	6	0	38	99
Propanil+Sethoxydim	20+3	10	0	28	96
Propanil+Sethoxydim+PO	20+3+0.25G	14	0	49	99
Propanil+MCPA-bee+Seth	20+4+3	16	0	64	82
Prop+MCPA-bee+Seth+PO	20+4+3+0.25G	24	1	73	98
DPX-M6/Seth+PO (3D)	0.12/3+0.25G	41	1	98	99
DPX-M6/Seth+PO (3D)	0.25/3+0.25G	75	13	98	99
DPXM6+X77/Seth+PO(3D)	0.25+0.25%/3+0.25G	48	1	97	99
DPX-M6316+Seth+PO	0.25+3+0.25G	44	4	96	96
Sethoxydim+PO	3+0.25G	1	0	1	99
Fluazifop+Brox+PO	3+4+0.25G	10	0	76	62
DPX-Y6202+Brox+PO	1+4+0.25G	5	0	74	38
Haloxyfop+Brox+PO	1+4+0.25G	8	0	59	1
Diclofop+Bromoxynil	16+4	8	0	44	58
Diclofop+Brox+PO	16+4+0.25G	10	0	45	55
C.V. %		46	185	21	8
LSD 5%		11	3	17	9

Summary

Treatments including DPX-M6316 caused 40% or greater flax injury. The addition of X-77 to DPX-M6316 increased flax injury and caused a 13% stand reduction. Treatments including propanil caused 10% or greater flax injury. Kochia control was 90% or greater with treatments including DPX-M6316. Treatments including sethoxydim plus petroleum oil provided 96% or greater yellow foxtail control. Flax was not harversted because surviving kochia made harvest impossible. Flax injured with DPX-M6316 appeared to recover and would have been the only harvestable plots.

Postemergence weed control in flax, Minot, 1985. 'Flor' flax was seeded on May 5. Treatments were applied to 6 to 7 inch flax and 4 to 5 leaf volunteer wheat on June 14 with 70F and 60% relative humidity. Delayed treatments(D) were applied on June 19 with 60F and 60% relative humidity. Treatments were applied with a bicycle wheel type plot sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with four replications. Crop injury and weed control were evaluated on July 17.

Treatment	Rate	Flax Yield	Flax Ht	Flax Tswt	Flax inj	Vowt
	(oz/A)	(lb/A)	(cm)		(%)	(%)
MCPA-dma+Sethoxydim+PO	4+3	1508	54	52.4	3	99
MCPA-bee+Sethoxydim+PO	4+3	1511	53	52.3	4	99
MCPA+Sethoxydim+PO	8+3	1476	52	52.4	6	99
Brox&MCPA-6E+Seth+PO	8+3	1460	50	52.1	4	99
Bromoxynil+Seth+PO	4+3	1468	57	52.3	1	99
Picloram+MCPA+Seth+PO	0.25+4+3	1373	48	51.9	29	99
Propanil+Sethoxydim	20+3	1391	53	52.4	5	99
Propanil+Sethoxydim+PO	20+3	1304	54	52.1	8	99
Propanil+MCPA-bee+Seth	20+4+3	1495	49	52.5	16	99
Prop+MCPA-bee+Seth+PO	20+4+3	1325	48	52.3	14	99
DPX-M6/Seth+PO (D)	0.12/3	1521	55	52.3	6	99
DPX-M6/Seth+PO (D)	0.25/3	1412	53	52.5	0	99
DPXM6+X77/Seth+PO(D)	0.25+/3	1489	56	52.1	10	99
DPX-M6316+Seth+PO	0.25+3	1508	54	52.3	14	99
Sethoxydim+PO	3	1476	56	52.3	1	99
Fluazifop+Brox+PO	3+4	1455	53	52.1	0	99
DPX-Y6202+Brox+PO	1+4	1447	57	52.1	0	99
Haloxyfop+Brox+PO	1+4	1444	54	52.3	3	99
Diclofop+Bromoxynil	16+4	1378	53	51.8	0	0
Diclofop+Brox+PO	16+4	1418	56	52.1	0	0
C.V. %		8	6	1.1	73	0
LSD 5%		NS	4	NS	6	NS

X-77 surfactant applied at 0.25% v/v; PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

Picloram plus MCPA and sethoxydim caused 29% flax injury. Propanil applied in combination with MCPA-bee and sethoxydim caused 10% or greater flax injury. DPX-M6316 plus X-77 and a tank mix of DPX-M6316 plus sethoxydim also gave 10% or greater flax injury. Picloram plus MCPA and sethoxydim, and propanil plus MCPA and sethoxydim reduced flax height. Flax yields tended to be lower with treatments including propanil and petroleum oil, and the picloram plus MCPA and sethoxydim treatment. Volunteer wheat control was 99% with all treatments except diclofop plus bromoxynil. A sparse population of volunteer wheat was the only weed present, thus flax yields were not influenced by the level of weed control.

<u>Weed control in flax, Williston, 1985.</u> 'Flor' flax was seeded into fallowed soil on May 7. Treatments were applied to 3 to 4 inch flax, 2 to 4 leaf green foxtail, 1 to 2 inch Russian thistle, and 0 to 4 leaf wild mustard on June 4 with 51F and 60% relative humidity. Delayed sethoxydim treatments (D) were applied on June 7 with 49F and 44% relative humidity. The experimental design was a randomized complete block with four replications. Weed control and flax injury were evaluated on July 13.

Treatment	Rate (oz/A)	Weed control Grft	Ruth	Wimu	Flax Inj	Strd
		------(%)	-----		--(%)	---
MCPA-dma+Sethoxydim+PO	4+3	75	48	80	8	8
MCPA-bee+Sethoxydim+PO	4+3	75	55	95	13	3
MCPA+Sethoxydim+PO	8+3	38	45	90	13	3
Brox&MCPA-6E+Seth+PO	8+3	75	93	98	8	2
Bromoxynil+Sethoxydim+PO	4+3	70	89	95	7	0
Picloram+MCPA+Seth+PO	0.25+4+3	56	76	92	57	0
Propanil+Sethoxydim	20+3	54	23	78	15	3
Propanil+Sethoxydim+PO	20+3	80	26	83	20	7
Propanil+MCPA-bee+Seth	20+4+3	66	68	93	18	13
Propanil+MCPA-bee+Seth+PO	20+4+3	73	54	97	23	2
DPX-M6/Sethoxydim+PO(D)	0.12/3	96	75	91	23	8
DPX-M6/Sethoxydim+PO(D)	0.25/3	96	79	88	3	20
DPX-M6+X-77/Seth+PO(D)	0.25+.25%/3	96	80	78	9	15
DPX-M6316+Sethoxydim+PO	0.25+3	66	90	90	17	7
Sethoxydim+PO	3	76	8	8	5	3
Fluazifop+Bromoxynil+PO	3+4	45	91	95	5	0
DPX-Y6202+Bromoxynil+PO	1+4	29	90	93	8	30
Haloxyfop+Bromoxynil+PO	1+4	45	97	97	5	0
Diclofop+Bromoxynil	16+4	50	90	95	12	8
Diclofop+Bromoxynil+PO	16+4	58	93	91	4	0
Control	0	0	0	0	0	0
C.V. %		27	17	12	70	204
LSD 5%		24	15	14	15	NS
No. of reps		4	4	4	3	3

PO = petroleum oil with 17% emulsifier applied at 1 qt/A; & = formulated mixture which was 1:1 for bromoxynil&MCPA

Summary

All treatments caused some stand injury. Treatments including propanil or picloram had the greatest injury. Green foxtail control was excellent with the delayed sethoxydim treatments. Green foxtail control with sethoxydim was lower when applied as a tank mix. Wild mustard control was good with all treatments except sethoxydim plus PO. All treatments including bromoxynil provided 88% or greater Russian thistle control. Flax was not harvested due to extremely dry conditions.

Weed control in flax, Langdon, 1985. 'Dufferin' flax was seeded in a moderately saline soil on May 19. Treatments were applied to pre-bud flax on July 5 with 70F and 60% relative humidity. Weed populations were light and variable. The experimental design was a randomized complete block with three replications. Flax injury and weed control were evaluated on July 25 and prior to flax harvest.

Treatment	Rate	July 25			Harvest				Flax	
		Inj	Coma	Grft	Inj	Coma	Grft	KOCZ	Tswt	Yield
	(oz/A)	(%)	(% control)		(%)	-(% control)--				(Bu/A)
Brox&MCPA	0.50	13	92	3	12	67	0	99	52.2	13.6
DPX-M6316	0.25	5	82	10	8	55	0	63	51.7	14.5
DPX-M6316+X-77	0.25	20	83	23	8	68	3	99	51.5	13.7
DPX-M6316+X-77	0.50	22	85	17	17	90	7	99	52.2	12.3
DPXM6+seth+PO	0.25+3	27	86	82	5	72	98	99	51.5	14.3
No treatment	0	0	0	0	0	0	0	0	51.5	14.7
C.V. %		23	4	31	36	15	15	3	0.8	8.9
LSD 5%		6	5	13	6	16	5	4	NS	NS

X-77 surfactant applied at 0.25% v/v; PO = petroleum oil with 17% emulsifier applied at 1 qt/A; & = formulated mixture which was 1:1 for bromoxynil&MCPA

Summary

All treatments caused some flax injury which generally was more evident on the July 25 evaluation than the harvest evaluation. DPX-M6316 at 0.5 oz/A was the only treatment to provide good common mallow control at both evaluation dates. DPX-M6316 plus sethoxydim was the only treatment to give good green foxtail control. All treatments except DPX-M6316 applied alone at 0.25 oz/A provided 99% kochia control. Flax yields were not different, probably due to the low weed densities.

Weed control in sunflower, Langdon 1985. Preplant incorporated (PPI) treatments were applied, roto-till incorporated twice, 'Cargill 204' sunflower seeded, and preemergence treatments applied on June 7. Precipitation for a two week period following sunflower seeding was 1.81 inches. Postemergence treatments were applied on July 10 with 75F and 60% relative humidity. The experiment was a randomized complete block design with four replications. Sunflower injury and weed control were evaluated on July 25.

		Weed Control			
Treatment	Rate	Wioa	Grft	Wimu	Colq
	(oz/A)	---------(%)----------			
Pendimethalin(PPI)	20	89	94	8	98
Trifluralin(PPI)	12	77	77	14	78
Ethalfluralin(PPI)	11	81	97	28	98
EPTC(PPI)	40	72	71	29	33
EPTC+fluo(PPI)	40+6	87	95	90	77
Trif+fluo(PPI)	12+8	67	88	78	95
Trif(PPI)+fluo(PPI)	12+6	85	99	99	99
Trif+prom(PPI)	12+24	76	96	72	95
Trif+prom(PPI)	12+48	58	89	79	91
Trif+clam(PPI)	12+32	86	98	87	99
Trif+isoxaben(PPI)	12+1.5	86	97	99	97
Etha+fluo(PPI)	12+8	87	93	87	97
Trif(PPI)+acif(P)	12+2	76	94	98	96
Pend(PPI)+AC 222,293(P)	20+2	75	90	98	95
Pend(PPI)+AC 222,293(P)	20+4	96	90	99	94
Pend(PPI)+AC 222,293(P)	20+6	91	94	98	94
Seth+AC 222,293(P)	3+4	97	98	99	0
C.V. %		21	18	25	21
LSD 5%		23	22	24	23

PO = petroleum oil with 17% emulsifier applied at 1qt/A.

Summary

None of the herbicides caused any substantial sunflower injury. Wild oat control was 90% or greater with treatments including AC 222,293 at 4 oz/A or greater. All treatments provided good green foxtail control. Treatments including Fluorochloridone (PE), isoxaben, AC 222,293, and aciflourfen provided 98% or greater wild mustard control. All treatments except trifluralin, EPTC, and EPTC plus fluorochloridone provided excellent common lambsquarter control.

Weed control in sunflower, Carrington 1985. Preplant incorporated (PPI) treatments were applied and field cultivator incorporated twice, 'Stauffer 894' sunflowers seeded, and preemergence (PE) treatments applied on June 13. Precipitation for a two week period following sunflower seeding totalled 1.8 inches. Postemergence (P) treatments were applied on July 13 with 75F and 60% relative humidity. The experimental design was a randomized complete block with four replications. Sunflower injury and weed control were evaluated on July 17.

Treatment	Rate	Weed control				
		Prpw	Rrpw	Colq	Grft	Wimu
	(oz/A)	(%)				
Pendimethalin(PPI)	20	95	94	95	97	0
Trifluralin(PPI)	12	96	96	94	95	0
Ethalfluralin(PPI)	11	94	95	98	96	0
EPTC(PPI)	40	49	63	86	95	28
EPTC+fluo(PPI)	40+6	81	88	92	96	96
Trif+fluo(PPI)	12+8	97	96	96	96	99
Trif(PPI)+fluo(PPI)	12+6	98	95	97	97	96
Trif+prom(PPI)	12+24	94	92	94	94	89
Trif+prom(PPI)	12+48	98	95	97	95	99
Trif+clam(PPI)	12+32	99	97	98	95	95
Trif+isoxaben(PPI)	12+1.5	95	95	94	92	99
Etha+fluo(PPI)	12+8	73	99	99	98	99
Trif(PPI)+acif(P)	12+2	91	91	88	95	92
Pend(PPI)+AC222,293(P)	12+2	89	90	95	97	98
Pend(PPI)+AC222,293(P)	12+4	95	96	97	97	97
Pend(PPI)+AC222,293(P)	12+6	94	90	90	95	97
Seth+AC 222,293(P)	3+4	8	13	25	80	93
C.V. %		16	9	15	3	8
LSD 5%		18	11	18	4	8

PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

None of the herbicides caused any substantial sunflower injury. All treatments provided good green foxtail control. All treatments except EPTC, sethoxydim plus AC 222,293 provided good control of prostrate pigweed, redroot pigweed, and common lambsquarter. All treatments except pendimethalin, trifluralin, ethalfluralin, and EPTC gave excellent wild mustard control. Weed control in general was good with all treatments.

Weed control in sunflower, Williston 1985. Preplant incorporated (PPI) treatments were applied and field cultivator incorporated twice, 'Cargill 204' sunflowers seeded, and preemergence (PE) treatments applied on May 14. Precipitation for a two week period following sunflower seeding totalled 0.09 inches. Postemergence (P) treatments were applied on June 12 with 70F and 60% relative humidity. The experimental design was a randomized complete block with four replications. Sunflower injury and weed control were evaluated on July 17.

		Sunflower		Weed control			
Treatment	Rate	Yield	Tswt	Wioa	Wimu	Ruth	Grft
	(oz/A)	(lb/A)		(%)			
Pendimethalin(PPI)	20	306	28.8	61	0	59	95
Trifluralin(PPI)	12	523	29.1	69	0	78	95
Ethalfluralin(PPI)	11	478	30.5	89	8	90	98
EPTC(PPI)	40	196	30.4	94	76	0	95
EPTC+fluo(PPI)	40+6	356	28.4	95	96	10	98
Trif(PPI)+fluo(PPI)	12+6	470	30.0	64	46	78	93
Trif(PPI)+fluo(PE)	12+8	674	30.1	74	76	80	88
Trif+prom(PPI)	12+24	441	28.5	69	13	86	93
Trif+prom(PPI)	12+48	429	30.1	80	0	86	95
Trif+clam(PPI)	12+32	846	29.1	41	71	90	93
Trif+isoxaben(PPI)	12+1.1	698	29.5	84	96	74	95
Trif+isoxaben(PPI)	12+1.5	679	28.9	85	86	88	95
Trif+isoxaben(PPI)	12+2.2	474	30.3	61	85	69	95
Etha+isoxaben(PPI)	12+1.1	798	29.0	95	85	90	88
Etha+isoxaben(PPI)	12+1.5	657	29.3	86	83	88	95
Etha+isoxaben(PPI)	12+2.2	755	29.5	91	84	80	95
Trif(PPI)+acif(P)	12+2	346	28.7	66	19	73	95
Pend(PPI)+AC293(P)	20+2	419	29.1	80	83	44	95
Pend(PPI)+AC293(P)	20+4	580	28.5	86	96	64	95
Pend(PPI)+AC293(P)	20+6	406	29.8	93	96	55	95
Seth+AC 222,293(P)	3+4	227	28.2	97	97	5	95
Seth+acif+PO(P)	3+1	261	28.7	96	76	18	93
Flua+AC293+PO(P)	3+4	285	28.5	95	99	0	95
Untreated	0	192	30.2	0	0	0	0
C.V. %		30	--	11	26	19	4
LSD 5%		203	--	12	23	16	7
# of Reps		4	1	4	4	4	2

PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

None of the herbicides caused any substantial sunflower injury. Several treatments provided good wild oats control. Treatments including AC 222,293 at 4 oz/A or greater gave excellent wild mustard control. Ethalfluralin plus isoxaben provided good Russian thistle control. All treatments provided good green foxtail control. Ethalfluralin and isoxaben combinations provided the best broad spectrum weed control. Sunflower yield generally related to weed control.

Weed control in sunflower, Minot 1985. Preplant incorporated (PPI) treatments were applied and roto-till incorporated twice, 'Cargill 206' sunflowers seeded, and preemergence (PE) treatments applied on May 29. Precipitation for a two week period following sunflower seeding totalled 1.81 inches. Postemergence (P) treatments were applied on June 30 with 65F and 70% relative humidity. The experimental design was a randomized complete block with four replications. Sunflower injury and weed control were evaluated on July 17.

Treatment	Rate (oz/A)	Weed control Prpw	Fipc	Colq
		--------(%)--------		
Pendimethalin(PPI)	20	99	74	99
Trifluralin (PPI)	12	99	38	97
Ethafluralin(PPI)	11	99	61	99
EPTC(PPI)	40	25	46	46
EPTC+fluo(PPI)	40+6	44	97	89
Trif+fluo(PPI)	12+8	98	97	99
Trif(PPI)+fluo(PPI)	12+6	99	99	99
Trif+prom(PPI)	12+24	74	72	74
Trif+prom(PPI)	12+48	99	96	99
Trif+clam(PPI)	12+32	99	97	99
Trif+isoxaben(PPI)	12+1.1	99	99	99
Trif+isoxaben(PPI)	12+1.5	99	99	99
Trif+isoxaben(PPI)	12+2.2	99	99	99
Etha+isoxaben(PPI)	12+1.1	99	99	99
Etha+isoxaben(PPI)	12+1.5	99	99	99
Etha+isoxaben(PPI)	12+2.2	99	99	99
Trif(PPI)+acif(P)	12+2	99	89	99
Pend(PPI)+AC 222,293(P)	20+2	98	96	99
Pend(PPI)+AC 222,293(P)	20+4	96	99	98
Pend(PPI)+AC 222,293(P)	20+6	98	98	99
Pend(PPI)+AC 222,293(P)	20+12	96	99	98
Seth+AC 222,293+PO(P)	3+4	5	98	13
C.V. %		16	17	16
LSD 5%		18	20	18

PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

None of the herbicide treatments caused any substantial sunflower injury except the postemergence treatment of acifluorfen with trifluralin(PPI). Prostrate pigweed and common lambsquarter control was 96% or greater with all treatments except EPTC, EPTC plus fluorochloridone, trifluralin plus prometryne, and sethoxydim plus AC 222,293. All treatments except pendimethalin, trifluralin, ethalfluralin, EPTC, and trifluralin plus prometryne provided good field pennycress control.

Postemergence weed control in sunflower, Casselton 1985. Preplant (PPI) treatments were applied, field cultivator plus harrow incorporated twice, and 'Seedtech 315' sunflower seeded on May 10. Postemergence treatments were applied June 7 (P1) with 75 F and 40% relative humidity to 2 to 4 leaf sunflower, 2 to 3 leaf yellow foxtail, and 4 to 6 leaf wild mustard, or on June 14 (P2) with 65 F and 50% relative humidity to 4 to 6 leaf sunflower, 3 to 4 leaf yellow foxtail, and 8 to 10 inch wild mustard. The experimental design was a randomized complete block with four replications. Sunflower injury and weed control were evaluated July 5, 1985.

Treatment	Rate	Sunflower Injury	Weed control Wimu	Weed control Yeft
	(oz/A)	(%)	-----(%)-----	
Pend(PPI)+acifluorfen(P1)	20+2	9	86	98
Pend(PPI)+AC 222,293(P1)	20+2	0	95	95
Pend(PPI)+AC 222,293(P1)	20+4	0	98	98
Pend(PPI)+AC 222,293(P1)	20+6	0	97	95
Pend(PPI)+AC 222,293(P1)	20+12	0	97	96
Pend(PPI)+AC293(P1)+AC293(P2)	20+4+4	0	99	96
Pend(PPI)+AC 222,293(P2)	20+2	0	42	95
Pend(PPI)+AC 222,293(P2)	20+4	0	41	98
Pend(PPI)+AC 222,293(P2)	20+6	0	60	98
Pend(PPI)+AC 222,293(P2)	20+12	0	75	97
Fluo(PE)+AC 222,293(P1)	12+6	0	99	20
Sethoxydim+AC 222,293(P1)	3+6	3	99	93
Fluazifop+AC 222,293+PO(P1)	3+6	5	97	92
DPX-Y6202+AC 222,293+PO(P1)	1.5+6	1	99	91
Haloxyfop+AC 222,293+PO(P1)	2+6	1	96	88
Sethoxydim+PO(P1)	3	0	1	99
Sethoxydim+PPG-1013+PO(P1)	3+0.08	6	87	97
Fluazifop+PO(P1)	3	0	4	97
Fluazifop+PO(P1)	4	0	3	99
Fluazifop+PO(P1)	12	0	4	99
DPX-Y6202+PO(P1)	1.5	0	1	96
Acifluorfen(P1)+seth+PO(P2)	2+3	13	83	98
DPX-L5300(P1)+seth+PO(P2)	0.6+3	14	98	98
seth+PO(P1)+acifluorfen(P2)	3+2	14	86	98
C.V. %		156	10	5
LSD 5%		5	9	6

PO = petroleum oil with 17% emulsifier applied at 1 qt/A.

Summary

None of the herbicide treatments caused any visible sunflower stand reductions. Acifluorfen and DPX-L5300 caused 9 to 14% sunflower injury. DPX-L5300 and AC 222,293 applied to 2 to 4 leaf sunflower provided 95% or greater wild mustard control. Wild mustard control was greater with AC-222,293 applied at P1 compared to P2. All treatments except Fluo + AC 222,293 provided 88% or greater yellow foxtail control.

Preemergence wild mustard control in sunflower, Casselton, 1985. 'Seedtech 315' sunflower were seeded in 30 inch rows on a silty clay soil with 5% organic matter, 7.8 pH, and good soil moisture. Preplant (PPI) treatments were applied, field cultivator plus harrow incorporated twice, sunflower seeded, and preemergence treatments applied on May 10. Precipitation for a 2 week period following treatment was 4.41 inches with 1.80 inches on the day of application. Crop injury and weed control were evaluated on June 25, 1985.

Treatment	Rate	Sunflower Injury	Sunflower Strd	Wimu
	(oz/A)	(%)	(%)	(% control)
EPTC (PPI)	48	0	0	6
Trifluralin (PPI)	16	0	0	0
Ethalfluralin (PPI)	15	0	0	6
Pendimethalin (PPI)	20	0	0	0
Ethalfluralin+fluo (PPI)	15+8	3	0	79
Trif+fluo (PPI)	16+8	0	0	84
Trif+fluo (PPI)	16+12	3	0	90
Trif+fluo (PPI)	16+16	0	0	95
Trif/fluo (PPI/PE)	16+6	0	0	51
Trif/prometryn (PPI)	16+32	0	0	10
Trif/prometryn (PPI)	16+48	0	0	18
Trif/prometryn (PPI)	16+64	0	0	88
Trif/prometryn (PPI/PE)	16+32	0	0	35
Trif/prometryn (PPI/PE)	16+48	0	0	56
Trif/prometryn (PPI/PE)	16+64	1	0	71
Trif+isoxaben (PPI)	16+1.1	1	0	91
Trif+isoxaben (PPI)	16+1.5	6	11	96
Trif+isoxaben (PPI)	16+2.2	0	3	92
Etha+isoxaben (PPI)	15+1.1	0	5	93
Etha+isoxaben (PPI)	15+1.5	5	6	94
Etha+isoxaben (PPI)	15+2.2	4	25	97
Trif+RE-40885 (PPI)	16+20	5	3	99
Trif+chloramben (PPI)	16+32	0	0	36
Fluorochloridone (PE)	16	0	0	83
CGA-24704 (PE)	20	0	0	0
CGA-24704 (PE)	40	0	0	6
C.V. %		213	188	24
LSD 5%		3	5	18

Summary

No substantial sunflower injury resulted from any of the treatments. Isoxaben caused up to 25% stand reductions. Isoxaben, RE-40885, and fluo at 12 and 16 oz/A provided 90% or greater wild mustard control when applied in combination with Trif or ethalfluralin. Green foxtail was generally controlled by the various herbicides applied for grass weed control or was suppressed by the dense wild mustard infestation.

Weed control in no-till sunflower, Fargo, 1985. 'Seedtec 315' sunflowers were seeded into standing wheat stubble on May 7. All treatments except the postemergence(P) treatment of sethoxydim plus PO were applied immediately after sunflower seeding. Precipitation for a two week period following the preemergence treatments was 3.34 inches. The postemergence treatment was applied to 4 to 6 leaf sunflower on June 7 with 75F and 60% relative humidity. The experimental design was a randomized complete block design with four replications. Crop injury and weed control were evaluated on June 27.

Treatment	Rate (oz/A)	Sunflower injury (%)	Yeft	KOCZ	Wimu
			----(% control)---		
Glyphosate+X-77	4	0	0	0	0
Glyphosate+Fluo+X-77	4+8	0	8	90	99
Glyp+Pend+Fluo+X-77	4+32+8	1	96	96	98
Glyp+Pend+EL-107+X-77	4+32+3	0	96	79	99
Sethoxydim+2,4-D+PO	2+8	1	3	35	36
Seth+2,4-D+Fluo+PO	2+8+8	6	18	98	99
Seth+2,4-D+Pend+Fluo+PO	2+8+32+8	5	92	97	99
Glyphosate&2,4-D&X-77	11	6	3	30	49
Glyp&2,4-D&X-77	22	4	5	18	34
Seth+2,4-D+Fluo+PO(PE)/ Seth+PO(P)	2+8+8+/4	4	99	98	98
Untreated	0	0	0	0	0
C.V. %		165	17	22	24
LSD 5%		NS	9	19	22
LSD 1%		NS	12	25	30

X-77 surfactant applied at 0.5% v/v; PO=petroleum oil plus 17% emulsifier at 1qt/A

Summary

None of the herbicide treatments caused any substantial sunflower injury. Many weeds emerged after the treatments were applied, resulting in poor weed control with the foliar active chemicals. Yellow foxtail control was good with the treatments which included pendimethalin or sethoxydim postemergence. All treatments including fluorochloridone gave good wild mustard and kochia control. The treatments including both pendimethalin and flourochloridone or fluorochloridone plus sethoxydim postemergence provided the best broad spectrum weed control.

Weed control in no-till sunflower, Minot, 1985. 'Cargill 2065F' sunflowers were seeded into standing wheat stubble on May 29. All treatments except the postemergence(P) treatment of sethoxydim plus PO were applied immediately after sunflower seeding. Precipitation for a two week period following the preemergence treatments was 1.81 inches. The postemergence treatment was applied to 4 to 6 leaf sunflowers on June 30 with 70F and 50% relative humidity. The experimental design was a randomized complete block design with four replications. Crop injury and weed control were evaluated on July 16.

Treatment	Rate	Sunflower injury	KOCZ	Wibu	Colq	Yeft
	(oz/A)	(%)	-------(% control)-------			
Glyphosate+X-77	4	0	79	84	78	71
Glyphosate+Fluo+X-77	4+8	0	89	95	92	97
Glyp+Pend+Fluo+X-77	4+32+8	0	94	91	92	97
Glyp+Pend+EL-107+X-77	4+32+3	5	90	88	91	98
Sethoxydim+2,4-D+PO	2+8	10	69	68	81	91
Seth+2,4-D+Fluo+PO	2+8+8	0	89	60	90	87
Seth+2,4-D+Pend+Fluo+PO	2+8+32+8	9	93	84	97	91
Glyphosate&2,4-D&X-77	11	0	90	97	91	94
Glyp&2,4-D&X-77	22	3	93	91	96	91
Seth+2,4-D+Fluo+PO(PE)/ Seth+PO(P)	2+8+8+4	3	91	93	97	98
Untreated	0	0	0	0	0	0
C.V. %		291	7	17	11	14
LSD 5%		NS	8	19	12	17
LSD 1%		NS	11	25	17	23

X-77 surfactant applied at 0.5% v/v; PO=petroleum oil with 17% emulsifier applied at 1qt/A

Summary

None of the herbicide treatments caused any substantial crop injury. Most weeds had emerged prior to sunflower seeding, thus weed control was generally good with all treatments. Glyphosate plus pendimethalin and fluorochloridone, glyphosate plus 2,4-D, and sethoxydim plus 2,4-D, and fluorochloridone with sethoxydim postemergence provided 90% or greater control of all weed species evaluated.

Fall and spring herbicide treatments for weed control in no-till sunflower, Fargo, 1985. Fall treatments (F) were applied in standing wheat stubble on a silty clay soil with pH 7.5 and 6% organic matter on October 17, 1984. Spring treatments (S) were applied May 7, 1985 immediately after seeding 'SeedTech 315' hybrid sunflower in 30 inch rows. Precipitation for a 2 week period following the fall and spring applications was 2.01 and 3.34 inches, respectively. The experimental design was a randomized complete block with four replications and experimental units were 10 by 24 ft. Crop injury and weed control were evaluated July 10, 1985.

Treatment	Rate	Sunflower injury	Weed control Yeft	KOCZ	Wimu
	(oz/A)	---(%)---	---------(%)--------		
Pend(F)	32	0	76	49	13
Pend+Fluo(F)	32+8	0	53	81	43
Pend+Fluo(F)	32+12	0	49	70	38
Fluo(F)/Seth+PO(S)	8+3	0	99	84	50
Fluo(F)/Seth+PO(S)	12+3	0	99	68	68
Prometryn(F)	32	0	10	35	23
Prometryn(F)	48	0	26	51	36
Pend+Prometryn(F)	32+32	0	44	25	8
Isoxaben(F)/Seth+PO(S)	3+3	0	97	43	66
Para+RE-40855+X-77(S)	8+24	0	32	97	83
Para+Pend+RE-40855+X77(S)	8+32+24	0	76	97	95
Para+Fluo+X-77(S)	8+8	0	0	96	92
Para+Fluo+X-77(S)	8+12	0	29	92	90
Para+Fluo+X-77(S)	8+16	0	26	96	92
Para+Fluo+X-77(S)	8+24	0	58	97	96
Para+Pend+Fluo+X-77(S)	8+32+8	0	83	98	97
Para+Pend+Fluo+X-77(S)	3+32+12	0	80	96	79
Para+prometryn+X-77(S)	8+32	0	15	70	35
Para+prometryn+X-77(S)	8+64	0	63	98	92
C.V. %		0	38	18	37
LSD 5%		NS	27	18	32

X-77 surfactant applied at 0.5% v/v where indicated; PO = petroleum oil plus 17% AT plus emulsifier applied at 1 qt/A.

Summary

Sunflower had good tolerance to all of the herbicide treatments. Excellent yellow foxtail control was obtained with treatments that contained spring applications of Seth. Foxtail control was poor with fall or spring applications of Pend, prometryn, Fluo, or RE-40855. Over 90% kochia control was obtained with treatments containing spring applied Fluo at 8 to 24 oz/A, RE-40855 at 24 oz/A, or prometryn at 64 oz/A. These treatments also gave the greatest level of wild mustard control. Treatments that gave the greatest level of control of all three weed species were Para + Pend + RE-40855 and Para + Pend + Fluo. Spring applications were more effective than fall applications for weed control in no-till sunflower.

Wild mustard competition in sunflower, Casselton 1985. 'Seed Tech 315' sunflower was seeded in an area infested with wild mustard, May 10, 1985. The various densities of wild mustard were established on June 10 when the sunflower and wild mustard were both in the four leaf stage. Excessive moisture prevented earlier establishment and also retarded plant growth. The plots were 10 by 25 ft and contained four rows of sunflower. Harvest was on Oct. 7.

Wild mustard	Sunflower	
(Pl/m row)	Seed yield (lb/A)	Yield reduction (%)
1	1889	5
3	1853	7
9	1643	18
27	1523	23
weed free	1996	
# OF REPS	2	
LSD 10%	273	
LSD 5%	356	

Summary

The sunflower and wild mustard growth were both less than optimum because of the excessive soil moisture. Sunflower yield generally decreased as wild mustard density increased. One wild mustard plant per meter of sunflower row tended to cause a yield loss. The experiment was established with four replications, but only two were analyzed because of variability in stand and soil moisture in the other two. (EMS 4df = 16411)

Preemergence weed control in dry bean and soybean, Casselton, 1985. Preplant (PPI) treatments were applied, field cultivator plus harrow incorporated twice, 'Fleetwood' navy bean and 'McCall' soybeans seeded, and preemergence (PE) treatments applied on May 21. Bentazon was applied to second trifoliolate beans, 3 to 6 inch wild mustard and common lambsquarter on June 24. Evaluation was on June 25, 1985.

Treatment	Rate	Soybean Inj.	Soybean Strd	Navy bean Inj.	Navy bean Strd	Weed Control Yeft	Weed Control Wimu	Weed Control Colq	Weed Control Rrpw
	(oz/A)	---------(%)--------				--------(%)--------			
EPTC(PPI)	48	31	4	1	0	83	45	60	83
Trifluralin(PPI)	16	0	0	0	0	79	0	95	95
Ethalfluralin(PPI)	15	0	0	0	0	81	0	92	97
Etha+chloramben(PPI)	15+29	4	0	1	0	93	83	97	97
Pendimethalin(PPI)	20	0	0	0	0	69	11	90	97
Trif+metribuzin(PPI)	16+3	0	0	3	0	84	76	90	95
Trif+lactofen(PPI)	16+4.8	0	0	1	0	73	60	88	93
Trif+cyanazine(PPI)	16+16	0	0	5	5	75	63	83	85
Trif+chloramben(PPI)	16+29	6	0	0	0	93	86	99	95
Alac+metr(PPI)	40+3	9	0	35	36	76	85	93	88
Alac+clam(PPI)	40+29	1	0	3	0	90	87	99	97
Alachlor(PPI)	40	0	0	0	0	53	16	60	78
Alachlor(PPI)	40	1	0	3	0	56	10	70	80
Metolachlor(PPI)	40	1	0	0	0	80	19	50	85
CGA-24704(PPI)	20	1	0	0	0	64	10	45	45
CGA-20704(PPI)	32	1	0	0	0	78	35	80	80
CGA-24704(PPI)	40	3	0	0	0	76	21	65	70
Acetochlor(PPI)	40	14	0	0	0	88	51	88	90
Cinmethylin(PPI)	24	6	28	6	38	96	89	99	99
Trif+clam+metr(PPI)	16+29+3	0	0	0	0	78	78	95	95
FMC-57020(PPI)	16	0	0	1	0	69	23	50	25
Cinmethylin(PE)	24	3	0	0	0	73	5	30	10
Cinm+metr(PE)	24+3	2	0	5	0	77	74	85	93
Cinm+fluo(PE)	24+8	5	0	3	1	83	97	25	48
FMC-57020+metr(PE)	16+7	1	0	24	14	94	94	95	95
FMC-57020+clam(PE)	16+29	3	0	4	0	99	94	99	99
FMC-57020(PE)	16	0	0	3	0	76	49	45	40
Cinm+lactofen(PE)	24+4.8	5	0	3	0	69	81	50	60
Cinm(PE)+bent(P)	24+12	3	0	0	0	74	95	45	35
C.V. %		158	190	281	301	15	30	20	19
LSD 5%		7	3	13	13	16	21	29	29

Summary

Cinmethylin applied alone and FMC-57020 applied with metribuzin or chloramben provided 94% or greater yellow foxtail control. FMC-57020 applied alone and cinmethylin plus bentazon resulted in 94% or greater wild mustard control. Greater than 90% control of all weeds present was obtained with dimethazone plus metribuzin or chloramben.

Postemergence broadleaf weed control in dry bean and soybean, Casselton 1985. An experiment was conducted to evaluate various herbicides for postemergence broadleaf weed control in dry bean and soybean. 'Fleetwood' navy bean and 'McCall' soybean were seeded in 30 inch rows on May 21. Treatments were applied June 24 (P1) with 65 F and 65% relative humidity to third trifoliolate navy bean, second trifoliolate soybean, 3 to 4 leaf green foxtail, and 6 inch wild mustard, or on July 3 (P2) with 80 F and 30% relative humidity to fourth trifoliolate navy bean, third trifoliolate soybean, 4 to 6 leaf green foxtail,and 8 inch to flowering wild mustard. Plots consisted of two rows of dry bean and two rows of soybean, and treatment was to one row of each type of bean the length of the 25 ft plots. Crop injury and weed control were evaluated on July 14.

Treatment	Rate	Navy	Soyb	Weed Wimu	Weed Grft
	(oz/A)	(% injury)		(% control)	
Bent+PO(P1)+bent(P2)	8+0.25G+8	1	0	75	0
Bent+PO(P1)	16+0.25G	1	1	99	0
Bent+acifluorfen(P1)	8+4	0	3	94	0
Bent+PO(P1)	12+0.125G	0	0	95	0
Bent+SOME(P1)	12+0.125G	1	0	95	0
Acif+Ag98(P1)	6+0.25G	6	1	98	8
Fomesafen+PO(P1)	4+0.25G	0	0	99	14
DPX-F0625+X-77(P1)	0.12+0.25G	11	0	98	0
PPG-1013(P1)	0.24	5	5	97	20
FMC-57020+PO(P1)	12+0.25G	6	0	54	64
Benazolin+PO(P1)	8+0.25G	14	10	64	0
Naptalam&dinoseb(P1)	16+8	14	1	83	4
Naptalam&2,4-DB(P1)	19.5+0.5	25	4	48	0
Imazaquin+X-77(P1)	1+0.25G	1	1	99	21
Lactofen(P1)	2.4	1	0	87	0
Lactofen+X-77(P1)	2.4+0.25G	9	4	93	8
Lactofen(P1)	3.2	5	1	96	18
C.V. %		103	162	9	101
LSD 5%		8	4	11	12

SOME = soybean oil methyl ester with 15% emulsifier; PO = petroleum oil with 17% emulsifier; Ag98 and X-77 = surfactant; & = formulated mixture which was 1:2 for naptalam&dinoseb, 40:1 for naptalam&2,4-DB; G under rate = gallon/A.

Summary

DPX-F6025, benazolin, naptalam&dinoseb, and naptalam&2,4-DB caused 11, 14, 14, and 25% navy bean injury, respectively. Soybean injury was 10% or less from any of the herbicide treatments. Bent, Acif, fomesafen, DPX-6025, PPG-1013, imazaquin, and lactofen generally provided 87% or greater wild mustard control. Green foxtail control was 21% or less with all treatments except FMC-57020, which provided 64% green foxtail control.

Postemergence grass and broadleaf control in dry bean and soybean, Casselton, 1985. Two rows each of 'Fleetwood' navy bean and 'McCall' soybean were seeded May 21, 1985 at Casselton, ND in 10 by 25 ft plots. Treatments were applied to third trifoliolate navy bean, second trifoliolate soybean, 3 to 4 leaf yellow foxtail, 6 inch wild mustard, 4 to 6 inch kochia, and 6 inch common lambsquarters on June 24, with 65 F and 50% relative humidity. The experiment was a randomized complete block design with four replications. Weed control and bean injury were evaluated on July 14, with a second yellow foxtail evaluation on September 12, 1985.

Treatment	Rate	Weed control				
		Wimu	Colq	KOCZ	Yeft1	Yeft2
	(oz/A)	(%)				
SC-1084+PO	4	0	0	0	68	85
SC-1084+bent+PO	4+12	98	96	89	10	15
Haloxyfop+PO	2	0	0	0	94	97
Haloxyfop+bent+PO	2+12	99	83	69	84	52
Sethoxydim+PO	3	0	0	0	97	97
Sethoxydim+bent+PO	3+12	99	93	75	54	20
Fluazifop+PO	5	0	0	0	92	96
Fluazifop+PO	2.5	0	0	0	93	96
Fluazifop+PO	3	0	0	0	94	96
Fluazifop+PO	4	0	0	0	94	97
Fluazefop+bent+PO	3+12	97	91	80	69	60
DPX-Y6202+PO	2	0	0	0	98	98
DPX-Y6202+bent+PO	2+17	99	91	81	73	13
Clopropoxydim+PO	1.5	0	0	0	92	97
Clop+bent+PO	1.5+12	99	94	81	46	0
Fenoxaprop+PO	2	0	0	0	99	98
Fenoxaprop+bent+PO	2+12	95	79	71	38	13
BAS-51702H+PO	0.5	0	0	0	46	55
BAS-51702H+PO	1	0	0	0	85	94
BAS-51702H+PO	1.5	0	0	0	98	99
BAS-51702H+bent+PO	1.5+12	98	94	85	28	5
C.V. %		4	16	33	15	19
LSD 5%		2	7	13	15	17

PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

None of the herbicide treatments caused any visible navy bean or soybean injury. Wild mustard control was 95% or greater with all bentazon treatments. Common lambsquarters and kochia control tended to be lower when bentazon was applied with haloxyfop or fenoxaprop than when applied with the other grass control herbicides. Wild mustard control with bentazon exceeded 95% regardless of the herbicide combination. Yellow foxtail control on September 12 was 85% or greater when the various grass herbicides were applied without bentazon. Bentazon antagonized yellow foxtail control with all the grass control herbicides, however bentazon was less antagonistic with haloxyfop and fluazifop than with the other herbicides. The bentazon antagonism of yellow foxtail control with the grass control herbicides was expressed more at the late evaluation date.

Weed control in soybean, Carrington 1985. Preplant treatments(PPI) were applied and soil incorporated twice with a field cultivator, and 'McCall' soybeans seeded on June 5. Preemergence treatments were applied on June 10. Postemergence treatments were applied to second trifoliolate soybeans (P1) on July 2 and to third trofoliolate soybeans (P2) on July 8. The split treatments were applied 3 days (3D) after the initial treatment. Soybean injury and weed control ratings were on July 17. Weed densities were approximately 5 plants per square foot except wild mustard was variable at about 1 plant per square foot.

Treatment	Rate	Soyb Inj	Soyb Strd	Weed control Prpw	Weed control Rrpw	Weed control Colq	Weed control Grft	Weed control Wimu
	(oz/A)	--(%)--		-----------(%)----------				
Alachlor+Clam(PPI)	32+32	5	15	86	94	95	95	90
Vernolate(PPI)	32	5	7	61	89	91	81	56
Trif(PPI)+Acif(P2)	16+6	0	10	98	96	97	96	80
Trif(PPI)+Metr(PPI)	16+3	5	7	90	95	96	97	96
Ethafluralin(PPI)	16	4	17	89	91	97	95	0
Trifluralin(PPI)	16	0	13	95	96	95	95	0
Pendimethalin(PPI)	20	6	12	86	92	93	95	24
Alachlor(PE)+Metr(PE)	40+6	3	2	97	98	98	98	74
Metolachlor(PE)	40	3	0	50	81	46	79	0
Acetochlor(PE)	32	3	0	85	96	88	95	53
FMC-57020(PE)	12	4	0	78	79	95	80	30
Seth+P(P1)/Acif(3D)	3+6	19	0	34	48	15	81	91
Seth+PO(P2)/Bent(3D)	3+8	13	0	26	35	25	76	96
Seth+PO(P2)/Bent(3D)	3+12	11	0	28	45	36	83	96
Seth+PO(P2)/ Napt&Dino(3D)	3+8+16	20	0	26	38	25	81	80
Seth+PO(P1)/Dino(3D)	3+24	13	0	15	10	38	76	91
C.V. %		71	136	25	17	19	10	44
LSD 5%		7	11	22	16	18	12	35
No. of reps		4	3	4	4	4	4	4

PO = petroleum oil with 17% emulsifier applied at 1 qt/A, & = formulated mixture which was 1:2 for naptalam&dinoseb

Summary

Several treatments caused visible stand reduction and injury to the soybeans. Trifluralin plus metribuzin provided greater than 90% control of all species present without important injury to soybeans. Herbicide treatments varied in their effectiveness for individual species.

Weed control in soybean, Langdon 1985. Preplant(PPI) treatments were applied and soil incorporated twice with a field cultivator, 'McCall' soybeans seeded, and preemergence treatments applied on June 7. Postemergence(P) treatments were applied to third trifoliolate soybeans on July 10. Soybean injury and weed control were evaluated July 24. Wild mustard and green foxtail were variable and less than 1 plant per square foot, while redroot pigweed, wild oats and common lambsquarter were greater than 10 plants per square foot.

Treatment	Rate	Soybean injury	Weed control Wioa	Grft	Wimu	Rrpw	Colq
	(oz/A)	--(%)--	-----------(%)----------				
Trif(PPI)+Metr(PPI)	16+3	10	78	99	66	99	96
Ethafluralin(PPI)	16	0	88	99	6	99	97
Trifluralin(PPI)	16	3	85	99	10	98	96
Pendimethalin(PPI)	20	1	79	96	0	98	96
Alachlor(PE)	40	5	75	96	59	94	83
Metolachlor(PE)	40	0	60	95	11	98	83
Acetochlor(PE)	32	1	90	98	68	99	91
FMC-57020(PE)	12	16	84	97	54	92	91
Seth+PO(P)	3	0	93	98	0	0	0
Dinoseb(P)	24	16	20	41	85	50	89
C.V. %		302	17	4	59	7	8
LSD 5%		NS	18	5	22	6	7
No. of reps		4	4	4	4	4	4

PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

Trifluralin and ethafluralin gave similar control of the various weed species. Wild mustard control was less than 68% regardless of treatment. Acetochlor gave greater than 90% control of all weeds except wild mustard.

<u>Additives with broadleaf herbicides for soybeans, Fargo 1985.</u> 'Lakota' soybeans, F1 sunflower, tame yellow mustard and 'Siberian' foxtail millet were seeded in adjacent 6 to 10 ft wide strips as bioassay species on June 7. Treatments were applied to one trifoliolate soybean, on 3 to 4 leaf sunflower and millet on July 2. The additives were petroleum oil 11N (PO) with 17% At Plus 300F (AT) emulsifier, once-refined soybean oil with 15% emulsifier from BASF (BE), and methylated sunflower oil (SM) with 15% AT all applied at 1 qt/A. X-77 of 0.25% v/v was included as a separate treatment. The experiment was a split plot with herbicides as the main effect and contained 3 replications. Species response was evaluated approximately 2 and 4 weeks after treatment. The average of the two evaluations is only presented in the Table, except for kochia control which was only rated at the second evaluation.

Herbicide	Rate oz/A	Additives					
		None	X-77	POAT	SOBE	SMAT	AVG
		-------(% kochia control)--------					
Bentazon	8	20	80	82	82	89	70
Acifluorfen	6	73	83	97	97	92	84
Lactofen	3	37	76	62	47	47	53
Fomesafen	4	15	33	64	70	86	54
Benazolin	8	82	83	90	95	90	88
FMC-57020	8	67	57	72	68	75	68
Chloramben	43	17	64	64	45	66	51
Dino&Napt	16+8	39	27	62	47	83	52
PPG-1013	0.3	33	45	53	38	20	38
Napt&2,4-DB	19+.5	10	7	23	23	28	18
DPX-F6025	0.06	0	18	33	52	37	28
Imazaquin	2	83	89	93	95	96	91
AC-269499	1	22	95	92	95	98	80
Average		38	58	68	66	70	

LSD 5% AdditivexHerb = 25, Herbicide = 11, Additive = 7

Herbicide	Rate oz/A	None	X-77	POAT	SOBE	SMAT	AVG
		------ (% sunflower control) -----					
Bentazon	8	49	57	59	55	58	56
Acifluorfen	6	22	44	71	70	83	58
Lactofen	3	4	24	42	19	33	24
Fomesafen	4	3	22	60	69	82	47
Benazolin	8	0	9	23	17	22	14
FMC-57020	8	93	91	94	92	93	93
Chloramben	43	0	2	5	0	2	2
Dino&Napt	16+8	37	57	57	56	62	54
PPG-1013	0.3	20	30	36	13	26	25
Napt&2,4-DB	19+.5	72	76	85	86	84	81
DPX-F6025	0.06	10	34	57	47	57	41
Imazaquin	2	52	55	81	75	97	72
AC-269499	1	34	78	91	90	97	78
Average		30	44	58	53	61	

LSD 5% AdditivexHerb = 8, Herbicides = 4, Additive = 2

Herbicide	Rate oz/A	Additives None	X-77	POAT	SOBE	SMAT	AVG
		------(% wild mustard control)-----					
Bentazon	8	99	98	99	99	97	98
Acifluorfen	6	48	75	94	93	98	82
Lactofen	3	18	57	79	46	57	51
Fomesafen	4	75	91	99	99	98	92
Benazolin	8	21	12	37	19	26	23
FMC-57020	8	36	38	42	32	37	37
Chloramben	43	26	37	43	12	25	28
Dino&Napt	16+8	49	60	67	63	81	64
PPG-1013	0.3	85	91	97	81	81	87
Napt&2,4-DB	19+.5	22	24	44	22	37	30
DPX-F6025	0.06	89	99	99	99	98	97
Imazaquin	2	92	93	99	99	99	96
AC-269499	1	96	99	99	99	99	98
Average		58	67	77	66	72	
LSD 5% AdditivexHerb = 11, Herbicide = 5, Additive = 3							
		---------(% soybean injury)--------					
Bentazon	8	0	0	2	0	0	0
Acifluorfen	6	1	2	7	3	11	5
Lactofen	3	2	8	12	3	5	6
Fomesafen	4	1	0	3	4	4	2
Benazolin	8	2	2	8	5	6	4
FMC-57020	8	0	1	6	0	0	1
Chloramben	43	0	1	2	1	0	1
Dino&Napt	16+8	1	2	10	7	13	6
PPG-1013	0.3	2	4	4	2	3	3
Napt&2,4-DB	19+.5	2	5	11	8	11	7
DPX-F6025	0.06	2	4	3	6	2	4
Imazaquin	2	0	3	2	2	1	2
AC-269499	1	0	3	9	2	5	4
Average		1	3	6	3	5	
LSD 5% AdditivexHerb = 4, Herbicide = 2, Additive = 1							
		----(% foxtail millet control)-----					
Bentazon	8	5	0	12	0	12	6
Acifluorfen	6	17	7	28	19	76	29
Lactofen	3	0	6	12	3	19	8
Fomesafen	4	22	15	21	26	56	28
Benazolin	8	3	3	2	5	4	4
FMC-57020	8	3	12	8	1	0	5
Chloramben	43	18	41	34	8	23	25
Dino&Napt	16+8	3	2	1	8	9	5
PPG-1013	0.3	3	15	10	6	12	9
Napt&2,4-DB	19+.5	0	2	10	12	7	6
DPX-F6025	0.06	7	8	4	10	5	7
Imazaquin	2	42	42	66	72	84	61
AC-269499	1	59	86	89	96	98	86
Average		14	18	23	21	31	
LSD 5% AdditvexHerb = 8, Herbicide = 5, Additive = 1							

Summary

Additves generally enhanced the phytotoxcity of the herbicides, except for FMC-57020 and chloramben. Petroleum oil and methylated sunflower oil generally enhances phytotoxicity more than once-refined soybean oil or X-77. Petroleum oil enhanced phytotoxicity more than methylated sunflower oil when with lactofen and PPG-1013 for the control of kochia, sunflower, and wild mustard. Methylated sunflower oil enhanced phytoxicity more than petroleum oil with acifluorfen, fomesafen, dinoseb plus napthalam, imazaquin, and AC-269499 for wild mustard, sunflower, and foxtail millet control.

Kochia control in soybeans with benazolin, Fargo, 1985. 'McCall' soybeans were seeded on June 6. Treatments were applied on June 13(P1), June 20(P2), July 3(P3), or July 9 (P4). P1 treatments were applied to 0.5 to 1 inch kochia and unifoliate to 1 trifoliolate soybeans with 70F and 40% relative humidity. P2 treatments were applied to 0.5 to 4.5 inch kochia and 1 to 2 trifoliolate soybeans with 55F and 65% relative humidity. P3 treatments were applied to 5 to 8 inch kochia and 4 to 6 trifoliolate soybeans with 78F and 50% relative humidity. P4 treatments were applied to 10 to 14 inch kochia and early bud stage soybeans with 80F and 35% relative humidity. The experimental design was a randomized complete block with four replications. Soybean injury and kochia control were evaluated on August 14 and October 9.

Treatment	Rate	Soybean 8/14	Soybean 10/9	Kochia 8/14	Kochia 10/9
	(oz/A)	(% injury)		(% control)	
Benazolin+PO(P1)	4+0.25G	0	0	25	33
Benazolin+PO(P1)	6+0.25G	0	0	25	35
Benazolin+PO(P1)	8+0.25G	0	0	28	35
Benazolin+PO(P1)	12+0.25G	0	0	27	44
Acifluorfen+X-77(P2)	2+0.5%	0	0	54	64
Acifluorfen+X-77(P2)	4+0.5%	9	0	54	65
Benazolin+PO(P2)	4+0.25G	8	0	48	60
Benazolin+PO(P2)	6+0.25G	5	0	58	64
Benazolin+PO(P2)	8+0.25G	6	3	64	69
Benazolin+PO(P2)	12+0.25G	13	6	78	76
Bentazon(P2)	8	0	0	28	50
Bentazon(P2)	12	0	0	48	56
Bentazon+PO(P2)	4+0.25G	0	0	41	49
Bentazon+PO(P2)	8+0.25G	0	0	71	71
Bentazon+PO(P2)	12+0.25G	0	0	73	71
Benazolin+acif+X-77(P2)	6+2+0.25G	4	0	70	71
Benazolin+acif+X-77(P2)	6+4+0.25G	3	0	84	79
Benazolin+bentazon(P2)	6+8	1	0	54	60
Benazolin+bentazon(P2)	6+12	1	0	61	66
Benazolin+bent+PO(P2)	6+4+0.25G	3	0	70	74
Benazolin+bent+PO(P2)	6+8+0.25G	1	0	64	69
Benazolin+bent+PO(P2)	6+12+0.25G	5	0	84	81
Benazolin+PO(P3)	4+0.25G	13	5	46	60
Benazolin+PO(P3)	6+0.25G	16	6	50	61
Benazolin+PO(P3)	8+0.25G	15	6	60	70
Benazolin+PO(P3)	12+0.25G	15	8	71	75
Benazolin+PO(P4)	4+0.25G	21	5	43	55
Benazolin+PO(P4)	6+0.25G	25	6	40	55
Benazolin+PO(P4)	8+0.25G	26	13	45	58
Benazolin+PO(P4)	12+0.25G	25	11	54	69

Summary

Soybean injury occurred with all benazolin rates applied P3 or P4. The best kochia control occurred with the P2 treatments. Benazolin plus bentazon and PO or benazolin plus acifluorfen and X-77 at the highest application rates gave the best kochia control.

Postemergence herbicides for wild mustard control in soybeans, Casselton, 1985. McCall soybeans were planted 2 inches deep in 30 inch rows in a Fargo silty clay soil with 5% organic matter and pH 7.0 on May 21. The experimental design was a randomized complete block with three replications and plots were four 30 inch rows by 30 ft. Herbicides were applied with a bicycle sprayer using 8.5 gpa, 40 psi, and 4 mph for foliar applications. Herbicides were applied on June 23. Crop and weed growth were: soybeans 2 trifoliate leaves, wild mustard 3 to 5 leaves. Evaluations were taken on July 8.

Treatment	Rate (oz/A)	% Wimu control	% Soybean IR
MCPA amine	0.5	58	35
MCPA amine	1.0	75	25
MCPA amine	1.5	100	40
2,4-D amine	0.5	78	30
2,4-D amine	1.0	87	38
2,4-D amine	1.5	98	35
Glyphosate	0.5	85	35
Glyphosate	1.0	93	63
Betazon+PO	12+16	85	3
Bentazon+MCPA amine+PO	12+0.25+16	98	18
Bentazon+MCPA amine+PO	12+0.5+16	98	15
Aciflurofen	12	100	3
Aciflurofen+PO	6+16	97	7
Aciflurofen+MCPA amine	6+0.25	85	15
Aciflurofen+MCPA amine	6+0.5	88	10
Aciflurofen+MCPA amine+PO	6+0.25+16	98	21
Aciflurofen+MCPA amine+PO	6+0.5+16	97	6
DNBP	24	62	13
DNBP+naptalam	32+16	78	30
LSD (0.05)		14	24

Summary

Rates of MCPA, 2,4-D, and glyphosate used for acceptable wild mustard control (85%) generally more injurious to soybeans. Bentazon and aciflurofen were generally the most selective of the treatments for wild mustard control in soybeans.

Preplant incorporated, preemergence and postemergence herbicides in corn. Casselton, 1985. 'Custom Farm Seed' corn was planted May 16, 1985 2 inches deep in 30 inch rows. The experimental design was a randomized complete block with four replications and plots were four 30 inch rows by 30 ft. Preplant incorporated, preemergence and preemergence incorporated treatments were applied on May 14. Preplant incorporated treatments were incorporated with two passes of a field cultivator and preemergence incorporated treatments were incorporated with one pass of a harrow. Postemergence treatments, except sethoxydim and the late bromoxynil treatment, were applied May 28. Crop and weed growth were: corn 1 to 2 leaves, grass 2 to 4 leaves, and broadleaf weeds 2 to 4 leaves. The late bromoxynil treatment was applied on June 7. Crop and weed growth were: corn 3 to 4 leaves, grass 4 to 5 leaves, and broadleaf weeds 5 to 6 leaves. Sethoxydim treatments were applied on June 29. Crop and weed growth were: corn 34 to 38 inches, grass 10 to 14 inches.

Treatment	Rate (lb/A)	% weed control	
		Wimu	Yeft
EPTC+Safener+cyanazine (PPI)	3.0+1.5	90	90
EPTC+Safener+Extender+cyanazine(PPI)	3.0+1.5	81	86
Cyanazine+alachlor(PPI)	1.5+2.0	89	84
Cyanazine+metolachlor(PPI)	1.5+2.0	74	69
Fluorochloridone(PEI)	0.5	88	31
Fluorochloridone+alachlor(PEI)	0.5+2.0	88	46
Fluorochloridone+cyanazine(PEI)	0.5+2.0	88	78
Cyanazine+acetochlor(PEI)	1.5+0.5	90	65
Cyanazine+alachlor(PEI)	1.5+2.0	82	77
Cyanazine+metolachlor(PEI)	1.5+2.0	84	71
Cyanazine+acetochlor(PEI)	1.5+0.5	90	65
Cyanazine+propachlor(PEI)	1.5+5.0	89	84
Pendimethalin+cyanazine(PE)	1.5+1.5	74	70
Acetochlor(PE)	1.5	85	85
Fluorochoridone(PE)	0.5	79	39
Pendimethalin(PE)+cyanazine+oil(PO)	1.5+1.2+1 qt	93	64
Pendimethalin(PE)	2.0	98	66
Bromoxynil(PO)	0.25	95	10
Bromoxynil(PO-late)	0.25	90	17
Bromoxynil+atrazine(PO)	0.25+0.25	88	44
Alachlor(PE)+sethoxydim(PO)	1.0+0.15	52	49
Alachlor(PE)+sethoxydim(PO)	1.0+0.20	76	72
Alachlor(PE)+tridiphane+cyanazine+oil(PO)	2.0+0.5+1.2+1 pt	94	89
Cyanazine(PE)+tridiphane+cyanazine+oil(PO)	1.5+0.5+1.2+1 pt	85	54
Cyanazine+tridiphane+oil(PO)	1.2+0.5+1 pt	99	35
Cyanazine+oil(PO)	1.2+1 qt	66	74
Bromoxynil+dicamba(PO)	0.25+0.125	94	0
Pendimethalin+2,4-D(PE,PO)	2.0+0.25	95	70
Alachlor+dicamba(PE,PO)		98	88
CN-11-6180(PO)	1.6	93	74
LSD (0.05)		21	29

Summary

Soil applied and postemergence applied herbicides generally were similiar for the control of wild mustard. Yellow foxtail control with the various treatments tended to be more variable than the control of wild mustard. Postemergence applications of cyanazine+tridiphane and cyanazine+oil provided less yellow foxtail control than alachlor preemergence followed by tridiphane and cyanazine+oil postemergence.

Weed control in safflower, Williston, 1985. Preplant (PPI) herbicides were applied and incorporated with a field cultivator and a multiweeder, and 'S-541' safflower was seeded on May 7. The preemergence (PE) treatment was applied on May 8. Postemergence(P) treatments were applied to 2 to 4 leaf safflower, 2 to 4 leaf green foxtail, 3.5 to 4 leaf wild oats, and 0.5 to 2 inch tall Russian thistle and wild mustard on June 4 with 45 F and 78% relative humidity. Weed infestation at evaluation was dense for Russian thistle, moderate for wild mustard, and light for wild oats and green foxtail. Safflower was harvested October 2. Severe drought stress limited yields.

Treatment	Rate	Safflower Yield	Safflower Strd	Safflower inj	Weed control Wimu	Weed control Ruth	Weed control Wioa	Weed control Grft
	(oz/A)	(lb/A)	(%)	(%)	(%)			
Trifluralin(PPI)	12	61	0	0	0	51	55	96
Trifluralin(PPI)	16	93	0	0	10	72	82	98
Trif+Triallate(PPI)	16+12	106	0	0	2	72	88	96
Pendimethalin(PPI)	16	60	0	0	0	58	60	98
Ethalfluralin(PPI)	12	134	0	0	11	81	87	98
Ethalfluralin(PPI)	16	236	0	0	59	90	93	98
Ethalfluralin(PPI)	24	302	1	0	75	93	94	98
Trif+Fluo(PPI)	12+6	171	0	0	59	62	75	94
EPTC+Fluo(PPI)	32+6	72	0	0	89	15	94	98
Trif/Fluo(PPI/PE)	12+6	127	0	0	93	35	30	99
Trif+Isoxaben(PPI)	16+1.4	179	8	0	94	39	0	94
Etha+Isoxaben(PPI)	16+1.4	390	9	0	96	84	94	100
Trif/Clsu+S(PPI/POST)	8+0.15	227	0	0	100	91	10	50
Trif/Clsu+S(PPI/POST)	8+0.3	272	0	1	100	92	8	74
Etha/Clsu+S(PPI/POST)	8+0.15	398	0	0	100	94	57	89
Trif/AC293(PPI/POST)	8+4	232	0	5	100	39	100	50
Trif/AC293(PPI/POST)	8+6	262	0	4	100	61	100	74
Clsu+Seth+PO(POST)	0.15+3	287	0	2	100	82	97	72
Chlorsulfuron+S(POST)	0.15	181	0	1	100	89	0	0
Chlorsulfuron+S(POST)	0.3	152	0	2	100	94	0	0
Clsu+AC293+S(POST)	0.15+4	238	0	2	100	89	97	0
Untreated check	0	48	0	0	0	0	0	0
LSD (0.05)		115	3	1	17	13	17	32

S = X-77 surfactant applied at 0.25% v/v; PO = petroleum oil with 17% emulsifier applied at 1 qt/A.

Summary

Fluorochloridone applied PPI in combination with trifluralin resulted in lower control of wild mustard than when surface applied. Fluorochloridone plus EPTC applied PPI provided better wild mustard control, but less Russian thistle control than fluorochloridone plus trifluralin. Isoxaben applied PPI in combination with trifluralin and ethalfluralin gave slight safflower stand reduction and less Russian thistle control than trifluralin or ethalfluralin alone. Chlorsulfuron and AC 222,293 applied postemergence after PPI herbicide treatments generally gave excellent broad spectrum weed control, no serious crop injury, and safflower yields five to seven times higher than that of safflower in the weedy control plot. Ethalfluralin generally provided better weed control and higher crop yields than trifluralin.

Postemergence weed control in safflower, Williston, 1985. An experiment was conducted to evaluate various herbicides for postemergence broadleaf and grass weed control in safflower. Plot area produced durum wheat in 1984. 'S-208' safflower was planted at 25 lb/A in 10 inch row spacing on April 15. Soil was a Grail silty clay loam with 2.9% organic matter and pH 6.2. All treatments except AC 222,293 were applied to 2 to 4 leaf safflower, 3.5 to 4 leaf wild oats, 3 leaf green foxtail, and 2 to 3 inch Russian thistle on May 16 with 42 F, wind northeast at 3 mph, and 86% relative humidity. AC 222,293 was applied with crop and weeds in essentially the same growth stages as above on May 17 with 50 F, wind northwest at 3 mph, and 74% relative humidity. Weed density was moderate for wild oats and green foxtail but light for Russian thistle. Weed control and safflower response evaluations were just prior to harvest August 27. Early drought limited yields.

		Safflower				Weed control		
Treatment	Rate	Yield	Inj	Strd	Tswt	Grft	Ruth	Wioa
	(oz/A)	(lb/A)	(%)	(%)		-------(%)-----		
Chlorsulfuron+X-77	0.15	202	3	0	38	0	90	0
Chlorsulfuron+X-77	0.3	178	12	0	36	15	95	0
Clsu+sethoxydim+PO	0.3+3	182	8	0	40	91	94	86
Clsu+fluazifop+PO	0.15+3	178	10	0	38	55	95	96
Clsu+sethoxydim+PO	0.15+4	215	9	0	38	80	92	89
DPX-M6316+X-77	0.25	99	4	0	38	0	95	0
DPX-M6316+X-77	0.5	135	2	0	38	0	95	0
DPX-M6316+seth+PO	0.25+3	199	2	0	41	89	95	92
DPX-L5300+X-77	0.25	46	98	76	31	0	96	2
DPX-L5300+X-77	0.5	21	98	82	30	0	96	5
DPX-L5300+seth+PO	0.25+3	59	99	50	30	45	86	49
Clsu+DPX-Y6202+PO	0.15+0.5	314	9	0	37	6	82	12
Clsu+DPX-Y6202+PO	0.15+1	259	4	0	39	44	93	48
AC 222,293	6	197	6	0	39	0	45	84
Untreated check	0	130	0	0	38	0	0	0
C.V. %		55	17	96	--	68	13	33
LSD (0.05)		127	6	19	--	27	15	18
# of Reps		4	4	4	1	4	4	4

X-77 = surfactant applied at 0.25 % v/v; PO = petroleum oil with 17% emulsifier applied at 1 qt/A.

Summary

Severe stand reductions and crop injury occurred when DPX-L5300 was applied to safflower. DPX-M6316 was less injurious to safflower than chlorsulfuron at the highest application rates. Addition of grass herbicides, sethoxydim and fluazifop tended to increase safflower injury from chlorsulfuron. The combination of chlorsulfuron with DPX-Y6202 resulted in the highest crop yields with little crop injury, even though control of wild oats was low. AC 222,293 gave good control of wild oats but did not control Russian thistle adequately.

Chlorsulfuron in safflower, Williston, 1985. 'S-208' safflower was seeded directly into durum wheat stubble on April 15. Treatments were applied to 2 to 4 leaf safflower, 3 to 4 leaf green foxtail, and 3 inch Russian thistle on May 16 with 42F and 86% relative humidity. All treatments were applied with a bicycle wheel type sprayer delivering 8.5 gpa at 35 psi. The experimental design was a randomized complete block with four replications. Weed control and crop injury were evaluated on August 27 prior to safflower harvest.

				Safflower		
Treatment	Rate	Grft	Ruth	Injury	Yield	Tswt
	(oz/A)	(% Control)		(%)	(bu/A)	(lb/bu)
Clsu+seth+PO	0.25+3+1QT	93	94	10	147.2	40.5
Clsu+seth+PO	0.167+3+1QT	91	91	2	200.4	40.7
Clsu+seth+PO	0.125+3+1QT	92	94	0	134.5	40.6
Clsu+seth+PO	0.083+3+1QT	89	66	0	159.0	40.4
Clsu+seth+PO	0.0625+3+1QT	90	48	0	163.1	40.5
Untreated	0	0	0	0	67.1	37.4
Clsu+PO	0.25+1QT	25	94	9	107.6	39.9
Clsu+PO	0.167+1QT	5	95	8	112.0	38.6
Clsu+PO	0.125+1QT	5	90	4	101.9	39.7
Clsu+PO	0.083+1QT	5	91	3	104.6	40.0
Clsu+PO	0.0625+1QT	5	74	3	107.0	39.6
Untreated	0	0	0	0	102.2	39.2
Clsu+X-77	0.25+0.25%	13	94	10	136.2	40.6
Clsu+X-77	0.167+0.25%	8	90	6	119.7	39.4
Clsu+X-77	0.125+0.25%	5	91	0	125.3	40.1
Clsu+X-77	0.083+0.25%	0	80	0	121.8	40.3
Clsu+X-77	0.0625+0.25%	5	74	1	107.0	39.4
Untreated	0	0	0	0	125.9	39.6
C.V. %		31	16	129	35.1	--
LSD 5%		13	16	6	62.0	--
No. of reps		4	4	4	4	1

Summary

Safflower injury was 10% or less with all treatments. All treatments including sethoxydim provided good green foxtail control. Russian thistle control was 90% or greater with chlorsulfuron rates of 0.125 oz/A and above. Safflower yields generally related to weed control.

Timing of postemergence chlorsulfuron treatments on safflower, Williston, 1985. 'S-208' safflower was seeded at 25 lb/A in 10 inch row spacing on April 15, into standing durum wheat stubble from 1984. Early treatments were applied to 2 to 4 leaf safflower and 1 to 2 inch tall Russian thistle and green foxtail on May 15. The 4 to 8 leaf stage treatments were applied on May 24 when the majority of the safflower plants had 6 leaves, green foxtail had 3 to 5 leaves, and Russian thistle was 4 inches tall. The 8 to 12 leaf treatments were applied on June 4 when the majority of the safflower plants had 9 to 11 leaves, green foxtail was in the 2 leaf to tillering stage, and Russian thistle was 5 inches tall. Weed control and safflower response evaluations were taken 4 weeks(4wk) after treatment and at harvest(har) on August 27. Severe drought limited yields. The weed density was low, but August rains and reduced crop canopy from the earlier drought allowed the weeds to develop fully.

Treatment	Rate	Yield	Safflower injury		Weed control			
			4wk	Har	Grft 4wk	Grft Har	Ruth 4wk	Wioa 4wk
	(oz/A)	(lb/A)	--(%)---		--------(%)-------			
Clsu+X-77(2-4lf)	0.15	100	2	1	0	5	95	0
Clsu+X-77(2-4lf)	0.3	115	6	5	11	11	95	0
Clsu+X-77(4-8lf)	0.15	94	1	0	0	6	95	0
Clsu+X-77(4-8lf)	0.3	76	4	9	19	19	95	0
Clsu+X-77(8-12lf)	0.15	77	2	8	0	0	94	0
Clsu+X-77(8-12lf)	0.3	51	5	6	8	8	95	0
Clsu+PO(2-4lf)	0.15	83	6	5	0	6	95	0
Clsu+PO(2-4lf)	0.3	108	6	12	0	0	94	0
Clsu+PO(4-8lf)	0.15	99	2	8	0	0	95	0
Clsu+seth+PO(2-4lf)	0.15+3	134	8	10	92	84	92	85
Clsu+seth+PO(2-4lf)	0.3+3	177	9	10	95	84	92	90
Clsu+seth+PO(4-8lf)	0.15+3	128	4	6	94	94	94	70
Clsu+seth+PO(4-8lf)	0.3+3	101	7	12	95	94	95	68
Clsu+seth+PO(8-12lf)	0.15+4	107	3	12	90	85	92	95
Clsu+seth+PO(8-12lf)	0.3+4	98	12	25	94	91	95	95
Untreated check	0	84	0	0	0	0	0	0
LSD (0.05)		45	4	8	16	14	3	20

X-77 = surfactant at 0.25% v/v; PO = petroleum oil with 17% emulsifier applied at 1 qt/A

Summary

Chlorsulfuron applied with X-77, petroleum oil, or sethoxydim + petroleum oil caused 12% or less injury to safflower, except for application at 0.3 oz/A with petroleum oil and sethoxydim to 8 to 12 leaf safflower. Injury to safflower tended to be greater when chlorsulfuron was applied with petroleum oil than X-77. Treatments containing both chlorsulfuron and sethoxydim gave good control of wild oats, green foxtail, and Russian thistle. Safflower yields were low because of the drought, but treatments generally tended to increase yield even with the low weed densities.

Weed control in tame buckwheat, Langdon, 1985. Preplant (PPI) treatments were applied and field cultivator incorporated twice, 'Moncan' buckwheat seeded, and preemergence(PE) treatments applied on June 7. Postemergence(P) treatments were applied to 5 inch buckwheat on July 15 with 65F and 65% relative humidity. Dense buckwheat canopies reduced spray coverage of weeds. The experimental design was a randomized complete block with three replications. Crop injury and weed control were evaluated on July 25.

Treatment	Rate	Wimu	KOCZ	Prpw	Buckwheat Strd	Buckwheat Inj	Buckwheat Yield
	(oz/A)	--(%	control)-		(%)	(%)	(lb/A)
Fluorochloridone(PPI)	4	63	23	10	0	0	839
Fluorochloridone(PPI)	6	76	38	13	6	0	525
Fluorochloridone(PPI)	8	66	21	15	3	4	496
Fluorochloridone(PE)	4	90	66	66	6	3	739
Fluorochloridone(PE)	8	93	69	75	25	14	655
Fluorochloridone(P)	1	71	59	30	0	26	560
Fluorochloridone(P)	2	73	61	34	0	35	455
Fluorochloridone(P)	4	75	65	14	0	36	490
Alachlor(PE)	48	82	68	96	30	11	404
2,4-D-dma(P)	2	92	45	24	0	54	368
AC 222,293(P)	2	60	35	13	0	26	616
AC 222,293(P)	4	67	43	8	0	35	581
AC 222,293(P)	6	64	46	0	0	39	319
No treatment	0	0	0	0	0	0	735
C.V. %		22	35	62	180	28	32
LSD 5%		22	23	25	13	8	253

Summary

All treatments except fluorochloridone applied PPI or at 4 oz/A PE caused 11% or greater buckwheat injury. Alachlor and fluorochloridone PE at 8 oz/A caused 30 and 25% stand reductions respectively. Fluorochloridone PE and 2,4-D provided the best wild mustard and prostrate pigweed control. Kochia and wild mustard not controlled with AC 222,293 exhibited chlorotic axillary branches which did not develop. Buckwheat yield generally related to crop injury and/or weed control.

<u>Low rate annual picloram and 2,4-D combination treatments for leafy spurge control</u>. Lym, Rodney G. and Calvin G. Messersmith. Previous research at North Dakota State University has shown that annual treatments of picloram + 2,4-D for 3 to 5 years will give similar leafy spurge control to expensive high rate picloram treatments. Picloram + 2,4-D at 0.25 + 1.0 lb/A generally gives 20 to 30% better leafy spurge control than picloram at 0.25 lb/A alone, but the benefit of a herbicide combination declines as the picloram or 2,4-D rate increases. Picloram + 2,4-D at 0.5 + 1.0 lb/A tends to give only 5 to 10% better control than picloram at 0.5 lb/A alone. The purpose of this experiment was to evaluate long-term leafy spurge control from annual treatments of picloram + 2,4-D at relatively low application rates.

The experiment was established at four locations in North Dakota. Spring treatments were applied on June 13, 18 and 19, 1984 at Dickinson, Hunter and Valley City, respectively, and the fall treatments were applied on September 5 and 18, 1984 at Valley City and the Sheyenne National Grasslands near McLeod, respectively. The soil was a loamy fine sand at Dickinson, a silty clay loam at Hunter, Sheldon and the Sheyenne National Grasslands and a loam at Valley City. Dickinson, located in western North Dakota, generally receives much less precipitation than the other two sites located in eastern North Dakota. The spring and fall treatments were applied annually in June or September 1984 and 1985. The herbicides were applied with a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. All plots were 10 by 30 ft in a randomized complete block design with four replications at each site except Hunter which had 8 by 25 ft plots and 3 replications. Evaluations were based on a visible estimate of percent stand reduction as compared to the control.

Picloram at 0.125, 0.25, 0.375 and 0.5 lb/A provided 12, 13, 41 and 46% leafy spurge control, respectively, as a spring applied treatment but only 2, 7, 4 and 15% control, respectively, as a fall applied treatment 12 months following initial application (Table). The addition of 2,4-D to picloram tended to increase leafy spurge control slightly from spring but not fall applied treatments. The slight increase in control was similar regardless of 2,4-D rate. Control was similar to previous experiments after one application for spring applied treatments, but lower than expected for fall treatments. The weather was very dry in North Dakota during the fall of 1984 and leafy spurge was under moisture stress when the treatments were applied. These conditions probably account for the lower than expected control in 1985. This experiment must be continued for several years to determine if the presently used picloram at 0.25 to 0.5 lb/A + 2,4-D at 1.0 lb/A treatment is the most cost effective application rate for an annual leafy spurge control program. (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.)

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

		Application time/location/evaluation date											
		Spring							Fall				
		Hunter		Dickinson		Valley City			Sheyenne		Valley City		
Treatment	Rate	June	Aug	June	Sept	June	Aug	Mean[a]	June	Aug	June	Aug	Mean[a]
	(lb/A)	(%)											
Picloram	0.125	38	3	0	0	5	4	12	59	3	0	0	2
Picloram	0.25	11	35	3	24	24	21	13	66	12	20	1	7
Picloram	0.375	78	83	10	46	44	34	41	72	5	47	3	4
Picloram	0.5	81	93	15	61	51	48	46	98	18	85	13	15
Picloram+2,4-D	0.125+0.125	3	28	8	14	13	38	8	52	5	21	0	2
Picloram+2,4-D	0.125+0.25	0	13	8	53	8	20	6	38	1	10	0	0
Picloram+2,4-D	0.125+0.5	7	3	10	72	3	64	7	35	4	4	0	2
Picloram+2,4-D	0.25+0.125	31	73	4	64	21	87	18	55	8	11	0	2
Picloram+2,4-D	0.25+0.25	48	76	15	77	19	92	26	58	4	20	0	2
Picloram+2,4-D	0.25+0.5	41	50	11	85	24	92	24	50	1	18	0	1
Picloram+2,4-D	0.375+0.125	74	76	6	67	38	73	36	91	8	48	8	8
Picloram+2,4-D	0.375+0.25	88	82	5	96	45	80	42	65	4	44	2	3
Picloram+2,4-D	0.375+0.5	33	46	15	98	47	81	31	80	26	50	3	14
Picloram+2,4-D	0.5+0.125	88	88	9	98	73	69	54	81	15	54	3	9
Picloram+2,4-D	0.5+0.25	88	73	9	96	65	80	51	94	9	55	5	7
Picloram+2,4-D	0.5+0.5	85	70	10	98	75	75	54	97	36	42	8	22
Picloram+2,4-D	0.25+1.0	17	18	18	86	48	94	29	68	3	27	4	3
LSD (0.05)		31	36	11	26	33	27	18	31	11	30	8	8

[a] Average control 12 months following the original 1984 treatment date.

Leafy spurge control with resulting forage production from several herbicide treatments. Lym, Rodney G. and Calvin 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 + 2,4-D at 0.25 + 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 were applied annually while the picloram alone and dicamba treatments were reapplied when leafy spurge control declined to 70% or less. Thus, picloram at 2.0 lb/A was reapplied at Valley City in August of 1985 but not at Dickinson and no spring picloram retreatment was needed at either site. Dicamba at 8.0 lb/A was reapplied in June 1985 at both locations but only at Dickinson in September 1985. 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 and 1985. 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.

All herbicide treatments have resulted in an economic loss at Dickinson despite excellent leafy spurge control from several treatments. This site generally receives 8 to 10 inches less rainfall than the Valley City location. Forage production averaged across all treatments was 909 lb/A at Dickinson and 2806 lb/A at Valley City (Table). Leafy spurge control from 2,4-D at 2.0 lb/A was not satisfactory from spring or fall applications at either site. However, it did provide short term control resulting in an economic gain at Valley City of $21 and $8/A as a spring and fall applied treatment, respectively. Leafy spurge control with picloram + 2,4-D at 0.25 + 1.0 lb/A averaged over both locations was 94% after two applications as a spring applied treatment, but only 2% when fall applied. Previous research at North Dakota State University has shown that annual application of this treatment in the spring or fall provides similar leafy spurge control. Leafy spurge was under drought stress in 1984 when the herbicides were applied which may have reduced the observed control. Forage production averaged for both locations was 2036 and 1713 lb/A for spring or fall application of picloram + 2,4-D at 0.25 + 1.0 lb/A, respectively.

Picloram at 2.0 lb/A provided 87% leafy spurge control as a spring applied treatment, but only 34% control when fall applied at Valley City. However, at Dickinson control was 36 and 85% when spring and fall applied, respectively (Table). Dicamba generally gave good leafy spurge control as a fall but not as a spring applied treatment. All treatments have reduced leafy spurge production compared to the control except the fall application of 2,4-D at 2.0 lb/A at Valley City. (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.)

Table. Leafy spurge control, forage production and estimated net return from several herbicide treatments at two sites in North Dakota. (Lym and Messersmith).

Herbicide: Original	Rate (lb/A)	Re-treatment	Rate (lb/A)	Total cost ($/A)	Control: June (%)	Control: Aug (%)	Yield[a]: Forage (lb/A)	Yield[a]: Leafy spurge (lb/A)	Utilization (AUD)	Net return ($/A)
Valley City										
Spring 1983										
2,4-D	2.0	2,4-D	2.0[b]	12.10	0	25	2180	1718	55	21
Picloram+2,4-D	0.25+1.0	Picloram	0.25+1.0[b]	28.10	24	92	2920	1273	73	16
Picloram	2.0	...	...	82.05	99	87	3250	1228	81	- 33
Dicamba	8.0	Dicamba	8.0	192.10	53	24	2949	1178	74	-148
Fall 1983										
2,4-D	2.0	2,4-D	2.0[b]	18.15	10	0	1712	2235	43	8
Picloram+2,4-D	0.25+1.0	Picloram+2,4-D	0.25+1.0[b]	42.15	60	4	2608	1651	65	- 3
Picloram	2.0	Picloram	2.0[c]	164.10	84	36	3722	247	93	-108
Dicamba	8.0	...	...	96.05	99	87	3128	612	78	- 49
		Control					2785	2429	0	
LSD (0.05)					20	18	380	363		
Dickinson										
Spring 1983										
2,4-D	2.0	2,4-D	2.0[b]	18.15	3	25	624	127	16	- 2
Picloram+2,4-D	0.25+1.0	Picloram	0.25+1.0[b]	42.15	23	96	1152	66	29	- 11
Picloram	2.0	...	...	82.05	89	34	1106	68	28	- 65
Dicamba	8.0	Dicamba	8.0[c]	192.10	23	30	749	76	11	- 89
Fall 1983										
2,4-D	2.0	2,4-D	2.0[b]	12.10	5	0	917	385	23	- 4
Picloram+2,4-D	0.25+1.0	Picloram+2,4-D	0.25+1.0[b]	28.05	30	0	819	421	21	- 30
Picloram	2.0	Picloram	2.0[c]	82.05	99	85	1116	4	28	- 65
Dicamba	8.0	Dicamba	8.0[c]	96.05	97	48	916	50	23	-178
		Control			0	0	779	778	0	
LSD (0.05)					11	14	280	173		

[a] Total production of 1984 and 1985 harvest.
[b] Annual retreatment.
[c] Applied when control is less than 70%.

<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 June 25 and September 3 near Valley City. Eight experiments to compare picloram 2% and 10%G formulations were established on September 14, 1982 and June 10, 1983 near Sheldon, ND, September 9, 1982, June 21, 1983, June 13 and September 11, 1984 near Dickinson, and June 14 and September 18, 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 to improve uniformity of distribution of the picloram 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 untreated 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 to 60 months after treatment (Table 1). The control averaged across all treatments after 24, 48 and 60 months was 54, 22 and 13% for spring applications and 78, 62 and 26% for fall applications, respectively. Fall applied dicamba at 8.0 lb/A and picloram at 2 lb/A as liquids provided similar control after 5 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 fall applied picloram 2%G at 1.5 and 2.0 lb/A provided satisfactory leafy spurge control after 48 months at 83 and 86%, respectively, but no treatment provided satisfactory control 60 months after application.

Picloram 2%G and 10%G at equal rates generally provided similar leafy spurge control at both Sheldon and Dickinson I (Table 2). 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 and 24 months after application. Leafy spurge control in 1985 at Sheldon was similar to control in 1984. However, the treatments at Dickinson did not provide satisfactory leafy spurge control in 1985, so specific evaluations were not taken. The soil at Sheldon is very sandy compared to the mostly clay soil at Dickinson which may have allowed deeper picloram movement in the soil profile and thus better long-term leafy spurge root control at Sheldon than Dickinson.

Leafy spurge control with picloram at 1.0 and 2.0 lb/A was similar for the 2%G and 10%G when blanks were added, but was much worse with 10%G than 2%G pellets without blanks (Table 2). Since 80% fewer pellets per acre are applied with picloram 10%G than with 2%G, uniform distribution with hand-held application equipment was 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 liquid (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 at all application rates except 0.5 lb/A (Table 2). Blanks were not mixed with the new 10%G formulation, but a uniform distribution still was obtained. Control was much lower at Dickinson II than at Sheyenne which again probably was due to deeper picloram movement in the sandy soil at Sheyenne than the clay soil at Dickinson. Unlike previous experiments, spring application of picloram granules provided better leafy spurge control than fall applications when evaluated 12 months after treatment. Fall precipitation was below normal and the soil was very dry until late October in 1984. The dry soil conditions after application apparently caused poor long term control despite adequate moisture in 1985.

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 10G pellets per square foot was increased by use of a smaller pellet. Generally spring and fall treatment provided similar long-term control except when application was made during very dry conditions. Picloram granules provided better long-term control in sandy compared to clay soils. (Cooperative investigation by Dep. of Agron. and ARS, U.S. Dep. 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).

Herbicide	Rate	Application and evaluation date																		
		Spring treatment (25 June 1980)									Fall treatment (3 Sept 1980)									
		6-81	9-81	6-82	9-82	6-83	9-83	6-84	9-84	6-85	6-81	9-81	6-82	9-82	6-83	9-83	6-84	9-84	6-85	8-85
	(lb/A)	(% control)																		
Picloram 2%G	1.0	97	80	53	25	44	22	10	8	3	95	86	84	55	76	52	51	52	18	10
Picloram 2%G	1.5	98	89	87	22	77	38	29	26	11	99	100	100	96	98	97	87	83	59	48
Picloram 2%G	2.0	99	98	90	53	85	72	56	62	28	100	100	99	100	100	98	93	86	68	63
Dicamba 5%G	4.0	74	55	9	3	4	0	4	0	0	94	74	43	31	31	29	18	20	17	9
Dicamba 5%G	6.0	82	54	25	3	16	5	4	3	1	96	99	89	58	55	55	41	40	22	6
Dicamba 5%G	8.0	91	75	45	19	29	6	5	6	0	99	100	98	83	84	78	66	67	39	20
Picloram 2S	2.0	100	99	98	90	94	79	64	71	54	100	100	100	100	98	94	79	78	50	28
Dicamba 4S	8.0	94	74	28	12	42	13	7	5	4	99	99	100	97	92	83	69	72	47	33
LSD (0.05)		9	14	21	17	20	11	11	12	20	3	10	22	29	24	24	29	23	26	23

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

Picloram formulation	Rate	Evaluation date 1983 June	1983 Aug	1984 June	1984 Aug	1985 June	1985 Aug	1983 June	1983 Aug	1984 June	1984 Aug	1985 June	1985 Sept
	(lb/A)	(% control)											
Applied Fall 1982		Sheldon						Dickinson I					
2%G+blanks	0.5	66	26	8	21	11	16	38	5	18	5	..	..
2%G+blanks	1.0	86	41	29	33	31	18	69	15	42	13	..	..
2%G+blanks	1.5	87	67	48	48	47	24	90	37	71	51	..	..
2%G	2.0	99	76	80	66	71	44	96	53	79	64	..	..
10%G+blanks	0.5	39	11	3	31	0	0	34	9	19	0	..	..
10%G+blanks	1.0	83	60	52	56	39	30	84	21	45	36	..	..
10%G+blanks	1.5	81	60	43	58	54	38	88	35	55	47	..	..
10%G+blanks	2.0	87	63	77	56	65	45	89	40	75	64	..	..
10%G	1.0	53	26	11	13	18	13	..	..	..	..	..	..
10%G	2.0	89	61	45	45	52	57	..	..	..	..	..	..
Liquid (2S)	2.0	94	67	55	44	30	35	94	42	60	41	..	..
LSD (0.05)		16	30	19	23	24	25	18	28	30	33		
Applied Spring 1983													
2%G+blanks	0.5	..	28	27	10	21	8	..	38	28	12	..	..
2%G+blanks	1.0	..	38	58	13	55	14	..	57	53	43	..	..
2%G+blanks	1.5	..	86	95	36	92	50	..	62	83	60	..	..
2%G	2.0	..	97	94	69	93	62	..	76	89	65	..	..
10%G+blanks	0.5	..	26	11	6	18	4	..	25	20	2	..	..
10%G+blanks	1.0	..	54	61	16	52	28	..	32	42	23	..	..
10%G+blanks	1.5	..	74	70	26	58	35	..	78	75	56	..	..
10%G+blanks	2.0	..	92	92	56	92	56	..	63	76	70	..	..
Liquid (2S)	2.0	..	93	79	39	76	57	..	96	94	51	..	..
LSD (0.05)			22	14	14	23	15	..	23	19	29	..	..
Applied Spring 1984		Sheyenne						Dickinson II					
2%G	0.5	..	..	..	83	89	53	..	..	..	0	0	0
2%G	1.0	..	..	..	96	99	83	..	..	..	38	48	8
2%G	1.5	..	..	..	96	100	97	..	..	..	43	62	13
2%G	2.0	..	..	..	98	100	98	..	..	..	83	88	53
10%G	0.5	..	..	..	64	75	19	..	..	..	3	0	4
10%G	1.0	..	..	..	95	99	84	..	..	..	31	43	23
10%G	1.5	..	..	..	97	99	94	..	..	..	56	45	16
10%G	2.0	..	..	..	97	99	94	..	..	..	72	56	31
Liquid (2S)	2.0	..	..	..	98	100	99	..	..	..	98	80	28
LSD (0.05)		..	..	..	8	10	16	..	..	..	23	24	21
Applied Fall 1984													
2%G	0.5	..	..	..	..	94	57	..	..	..	..	71	16
2%G	1.0	..	..	..	..	100	91	..	..	..	..	85	39
2%G	1.5	..	..	..	..	100	96	..	..	..	..	97	56
2%G	2.0	..	..	..	..	100	97	..	..	..	..	98	81
10%G	0.5	..	..	..	..	82	42	..	..	..	..	46	15
10%G	1.0	..	..	..	..	96	81	..	..	..	..	79	36
10%G	1.5	..	..	..	..	99	91	..	..	..	..	91	45
10%G	2.0	..	..	..	..	99	91	..	..	..	..	95	68
Liquid (2S)	2.0	..	..	..	..	100	99	..	..	..	..	99	47
LSD (0.05)		..	..	..	..	6	16	..	..	..	..	9	17

Leafy spurge control following a six-year management program. Lym, Rodney G. and Calvin G. Messersmith. An experiment to evaluate long-term leafy spurge management was established at four sites (Sheyenne National Grassland near McLeod, Sheldon and two near Valley, City) in North Dakota in 1980. All sites were established in early June except one site which was established in September 1980. The herbicides applied in 1980 included 2,4-D and picloram as liquid (2S) and granule (2%G) formulations, and picloram applied using the roller and pipe-wick applicators. The conventional broadcast treatments were applied using a tractor-mounted sprayer delivering 8 gpa water at 35 psi. A granular applicator was used to apply the picloram 2%G treatments. Solution concentration in the roller was 0.25 lb/gal; this is the same solution concentration as picloram at 2 lb/A sprayed at 8.5 gpa. The solution concentration was increased for the pipe-wick applicator to picloram at 0.5 lb/gal since the pipe-wick applied about half the total volume per acre as the roller applicator. The roller and pipe-wick applicator height was adjusted to treat the top one-half of the tallest leafy spurge stems. The additive in the roller and pipe-wick treatments was a 5% (v:v) oil concentrate (83% paraffin based petroleum oil plus 15% emulsifier). The plots were 15 by 150 ft and treatments were replicated twice at each site in a randomized complete block design. In June 1981 each plot was divided into six 7.5 by 50 ft subplots for retreatments of 2,4-D, picloram 2S, dicamba or no treatment except the fall Valley City site which was retreated in August 1981.

Original 1980 whole plot treatments were reapplied in 1982 with several of the treatments changed. A carpet applicator was substituted for the roller applicator. The granular picloram treatments were replaced by picloram applied with the pipe-wick or carpet applicator with two passes, the second pass in the opposite direction to the first. Dicamba at 8.0 lb/A spray applied replaced the picloram plus oil concentrate pipe-wick applied treatment. The carpet applicator was designed by Magnolia Spray Equipment Corp., Jackson, MS, and consists of a 1 by 8 ft carpet attached to a rectangular spray box. The herbicide solution was sprayed onto the backside of the carpet through nozzles inside the spray box. Excess solution was returned to the spray tank. The picloram solution on the carpet applicator was 0.25 lb/gal and 0.4 lb/gal for two and one pass applications, respectively. The whole plots were retreated in 1982 with the original treatment except picloram at 2 lb/A was reapplied to the control subplot only since subplots receiving annual retreatments maintained satisfactory leafy spurge control. The experimental site at the Sheyenne National Grasslands was treated in the fall of 1982 to establish an equal number of spring and fall treatment sites. Subplot retreatments were applied again in 1983, 1984, and 1985. Evaluations are based on visual percent stand reduction as compared to the control.

In general, leafy spurge control was higher from spring applied treatments compared to similar fall applied treatments (Table). Previous research at North Dakota State University has shown spring or fall applied treatments to give similar leafy spurge control; however, in this study the fall treatments were applied to leafy spurge plants that had been mowed in July of each year through 1984. Thus, the plants were shorter and in the vegetative growth stage compared to the normal fall growth stage. This reduced the plant area treated and may have resulted in less herbicide uptake and translocation. The plants were not mowed in 1985 so this variable should not affect control from fall treatments in the future.

Picloram (2S) at 1 and 2 lb/A provided the best long-term leafy spurge control regardless of retreatment (Table). Picloram at 1 and 2 lb/A provided 77 and 91% control as spring applied treatments, but only 51 and 63% control as fall applied treatments, respectively. Leafy spurge control was similar regardless of retreatments. Thus, when higher rates of picloram are applied every few years, there is little advantage in using more than 1 lb/A or in applying annual retreatment.

Dicamba at 8 lb/A alone spring applied averaged 42% control, but control increased to 96 and 92% with retreatments of picloram at 0.25 lb/A or picloram + 2,4-D at 0.25 + 1 lb/A (Table). Leafy spurge control from fall applied dicamba at 8 lb/A averaged 16% and increased to an average of 57% following retreatments of picloram at 0.25 lb/A, picloram + 2,4-D at 0.25 + 1 lb/A or dicamba at 2 lb/A.

Annual application of 2,4-D, the most economical treatment in the study provided only 2 and 21% leafy spurge control as a fall and spring applied treatment, respectively (Table). Leafy spurge control was increased to 72% when the 2,4-D original treatment was retreated with picloram + 2,4-D at 0.25 + 1 lb/A annually in the spring, but the same fall applied treatment provided only 22% control.

The annual retreatments that provided the highest leafy spurge control were picloram + 2,4-D at 0.25 + 1 lb/A, picloram at 0.25 lb/A and dicamba at 2 lb/A (Table). These retreatments averaged 74 and 52% leafy spurge control as spring and fall applied treatments, respectively, when averaged over all whole plot treatments. Annual retreatments of 2,4-D or dicamba at 1 lb/A averaged only 53 and 29% leafy spurge control as spring and fall applied treatments averaged over whole plot treatments, respectively. Leafy spurge control was increased 9% when 2,4-D was added to picloram as an annual treatment spring applied, but not when fall applied. Thus, the most practical retreatment when considering both cost and control were picloram at 0.25 lb/A alone or picloram + 2,4-D at 0.25 + 1 lb/A, but dicamba at 2 lb/A would be the retreatment of choice where picloram could not be applied such as in areas with water tables 10 ft or less below the surface.

No treatment using a reduced-volume applicator maintained satisfactory control alone. The reduced volume applicators would not have an economic advantage if several annual retreatments were required for satisfactory leafy spurge control. Several herbicide treatment alternatives provided 80% or more leafy spurge control 5 years after the initial treatment, but no treatment program had eradicated leafy spurge. (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.)

Table. Leafy spurge control in North Dakota following a six-year management program.

Whole Plot: Treatment[a] 1980	Rate (lb/A)	Soln conc[b] (lb/gal)	Treatment[a] 1982	Rate (lb/A)	Soln conc[b] (lb/gal)	Retreatment subplot 1981, 1983-1985/rate lb/A: 2,4-D 1.0	Dicamba 1.0	Dicamba 2.0	Picloram 0.25	Picloram +2,4-D 0.25+1.0	Control 0	Mean
						(% control)						
Spring applied												
2,4-D	2.0	0.24	2,4-D	2.0	0.24	21	21	41	58	72	9	36
Picloram 2%G	1.0	....	Picloram (carpet-2 pass)	...	0.25	40	47	65	59	78	42	55
Picloram 2%G	2.0	....	Picloram (wick-2 pass)	...	0.5	86	85	91	94	94	82	89
Picloram 2S	1.0	0.13	Picloram 2S	1.0	0.13	81	72	92	78	91	46	77
Picloram 2S	2.0	0.25	Picloram 2S[c]	2.0	0.25	86	96	96	92	88	86	91
Picloram (Roller)	...	0.25	Picloram (carpet)	...	0.25	18	26	44	51	54	22	36
Picloram+oil conc.(Roller)	...	0.25	Picloram (carpet)	...	0.25	38	40	79	63	83	31	55
Picloram (Wick)	...	0.5	Picloram (wick)	...	0.5	55	50	46	78	74	8	52
Picloram+oil conc.(Wick)	...	0.5	Dicamba	8.0	1.0	71	72	80	96	92	42	75
Control	...	....	Control	...	....	12	17	73	61	70	0	39
Mean						52	53	70	73	80	38	
LSD (0.05) whole plot = 8; subplot = 6; whole plot x sub-plot = 18												
Fall applied												
2,4-D	2.0	0.24	2,4-D	2.0	0.24	2	20	31	25	22	0	17
Picloram 2%G	1.0	....	Picloram (carpet-2 pass)	...	0.25	19	48	68	46	56	21	43
Picloram 2%G	2.0	....	Picloram (wick-2 pass)	...	0.5	41	32	57	51	49	26	43
Picloram 2S	1.0	0.13	Picloram 2S	1.0	0.13	33	44	45	46	66	73	51
Picloram 2S	2.0	0.25	Picloram 2S[c]	2.0	0.25	44	52	76	63	70	75	63
Picloram (Roller)	...	0.25	Picloram (carpet)	...	0.25	30	23	69	43	52	31	41
Picloram+oil conc. (Roller)	...	0.25	Picloram (carpet)	...	0.25	46	40	73	50	72	39	53
Picloram (Wick)	...	0.5	Picloram (wick)	...	0.5	21	25	55	25	48	15	32
Picloram+oil conc. (Wick)	...	0.5	Dicamba	8.0	1.0	17	27	61	61	50	16	39
Control	...	....	Control	...	....	0	15	41	51	47	0	27
Mean						25	33	58	46	53	31	
LSD (0.05) whole plot = 15; subplots = 12; whole plot x subplot = 36												

[a] Spray applied except the treatments identified as roller, wick or carpet applicator applied.
[b] Herbicide:water (v/v)
[c] Applied to control subplot only.

<u>Screening trials of various herbicides, herbicide combinations and surfactants for leafy spurge control</u>. Lym, Rodney G. and Calvin G. Messersmith. Four experiments to evaluate several herbicides and additives for leafy spurge control were established near Sheldon, ND, and on the Sheyenne National Grasslands near McLeod, ND, in 1984 and 1985. The herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. All plots were 10 by 30 ft in a randomized complete block design with four replications. Evaluations were based on percent stand reduction as compared to the control.

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 on June 10, 1983 in an effort to increase picloram translocation into the leafy spurge root system. Leafy spurge was flowering and 18 to 24 inches tall. Leafy spurge regrowth in plots treated with picloram + amitrole lacked chlorophyll 1 year after application, but plant density was similar to plots treated with picloram alone (Table 1). There was a tendency for leafy spurge control to be increased when amitrole was added to picloram compared to picloram alone 24 months following application, but grass injury from amitrole would prohibit use in pasture and rangeland.

Research using a roller applicator to apply picloram in pasture showed increased leafy spurge control with a boom-end marking foam additive in one experiment, but not when other surfactants or oils were added. An experiment was established on June 14 and 15, 1984 at the Sheyenne National Grasslands and Sheldon, respectively, to evaluate the foam as an additive to picloram spray applied. The leafy spurge was 10 to 18 inches tall and beginning seed set at both sites. Initial control was better at Sheyenne than Sheldon regardless of treatment, but the foam additive did not increase control compared to picloram alone at either site (Table 1). No treatment provided satisfactory leafy spurge control 15 months after application.

Previous research has shown picloram + 2,4-D at 0.25 + 1.0 lb/A provides better leafy spurge control compared to picloram alone. The third experiment was established to compare the alkanolamine and mixed amine salts (EH-736) of 2,4-D for leafy spurge control alone and when tank mixed with picloram. The experiment was begun on the same dates and locations as the additive experiment. Leafy spurge control was similar at Sheldon when the 2,4-D formulations were applied alone or with picloram (Table 1). However, at the Sheyenne National Grasslands there was a tendency for better leafy spurge control when picloram was combined with EH-736 than the alkanolamine formulation. The 2,4-D formulations provided similar control when applied alone. Research was begun in 1985 to further evaluate EH-736 as an additive to picloram for leafy spurge control.

AC 252,925 was applied for leafy spurge control at three different growth stages in 1984. Various rates of the compound were applied on May 29 when leafy spurge was in the vegetative growth stage, on June 15 during flowering and seed set, and on September 18 during vigorous fall regrowth following a summer dormancy period. AC 252,925 provided good initial top growth control especially at 2.0 lb/A but grass damage was severe at all application dates (Table 2). Control in May 1985 averaged across all dates and rates was 91% but grass injury was severe. Leafy spurge control decreased rapidly 12 to 15 months after application, but grass damage remained high. (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.)

Table 1. Leafy spurge control with picloram in combination with amitrole, a foam additive and 2,4-D. (Lym and Messersmith).

		Location/evaluation date									
		Sheldon							Sheyenne		
		June 1984		Aug 1984		May 1985		Aug 1985	Aug 1984	May 1985	Aug 1985
Treatment	Rate (lb/A)	Control	Grass injury	Control	Grass injury	Control	Grass injury	Control	Control	Control	Control
		(%)									
Experiment 1											
Amitrole+picloram	1.25+0.5	34	10	13	5	28	..	..	..	..	..
Amitrole+picloram	2.5+0.5	38	25	25	18	21	..	..	..	..	..
Amitrole+picloram	5.0+0.5	50	75	23	45	20	..	..	..	..	..
Amitrole+picloram	1.25+1.0	73	12	34	3	40	..	..	..	..	..
Amitrole+picloram	2.5+1.0	79	30	31	20	61	..	..	..	..	..
Amitrole+picloram	5.0+1.0	74	72	35	53	49	..	..	..	..	..
Picloram	0.5	40	0	18	0	3	..	..	..	..	..
Picloram	1.0	64	0	28	0	29	..	..	..	..	..
Amitrole	5.0	25	63	16	57	11	..	..	..	..	..
LSD (0.05)		27	16	25	22	31	..	..	..	..	..
Experiment 2											
Picloram	0.5	..	..	57	..	25	..	4	94	91	20
Picloram	1.0	..	..	87	..	81	..	21	98	99	13
Picloram+foam[a]	0.5+0.5%	..	..	51	..	26	..	4	95	96	2
Picloram+foam[a]	1.0+0.5%	..	..	81	..	70	..	8	98	99	44
LSD (0.05)		..	..	21	..	26	..	12	5	7	24
Experiment 3											
Picloram	0.25	..	..	35	..	11	..	..	76	23	4
Picloram	0.5	..	..	37	..	9	..	..	95	75	43
Picloram + 2,4-D alkanolamine	0.25+1.0	..	..	21	..	4	..	..	78	14	6
EH-736[b]	4.0	..	..	19	..	4	..	..	47	7	13
Picloram + EH-736[b]	0.25+1.0	..	..	22	..	8	..	..	94	72	23
2,4-D alkanolamine	4.0	..	..	24	..	1	..	..	42	20	7
LSD (0.05)		..	..	21	..	9	..	..	15	25	15

[a] Boom-end marking foam (Stamfoam, Stam Manufacturing Co., Wateska, IL)

[b] Mixed amine salts of 2,4-D (2:1 dimethylamine:diethalolamine)

Table 2. Leafy spurge control with AC 252,925 applied at various times during the growing season. (Lym and Messersmith).

		Evaluation/date					
		Aug 1984		May 1985		Aug 1985	
Treatment	Rate[a]	Control	Grass injury	Control	Grass injury	Control	Grass injury
	(lb/A)	(%)					
Applied 29 May 84							
AC 252,925	0.5	23	7	95	60	18	20
AC 252,925	1.0	68	58	75	80	8	60
AC 252,925	2.0	92	45	99	90	3	80
Applied 15 June 84							
AC 252,925	0.5	76	22	65	50	0	20
AC 252,925	1.0	79	23	94	90	0	80
Ac 252,925	2.0	93	38	99	90	66	70
Applied 18 Sept 84							
Picloram	2.0	..	..	100	10	97	0
AC 252,925	0.5	..	..	97	100	6	20
AC 252,925	1.0	..	..	99	100	17	50
AC 252,925	2.0	..	..	100	100	35	80
LSD (0.05)		18	23	24	3	35	5

[a] All AC 252,925 treatments included 0.5% surfactant wk (v/v)

Leafy spurge control in a wooded area of the Sheyenne National Grasslands. Lym, Rodney G. and Calvin G. Messersmith. Leafy spurge is a major problem in wooded areas, shelterbelts, and around homes. The purpose of this experiment was to evaluate the controlled droplet applicator (CDA) for application of picloram, dicamba, and glyphosate to leafy spurge growing under trees.

The experiment was established in a wooded area of the Sheyenne National Grasslands near McLeod, ND, on September 21, 1982. The leafy spurge was 28 to 34 inches tall with slight frost injury. The trees were Populus spp. (cottonwood and aspen) and ranged from 6 to 16 inches in diameter with some saplings intermixed. The weather was clear, 69 F, 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 were applied with single coverage at walking speed, except some overlap occurred as the applicator tried to prevent skipped areas while walking around trees. Approximately 0.8 gal/A of herbicide solution was applied. Evaluations were based on visual estimates of percent stand reduction as compared to the control.

Herbicide	Herbicide concentration (lb/gal)	Control 1983 June	Control 1983 August	Control 1984 June	Control 1984 August	Control 1985 June
		(%)				
Picloram	0.25	92	60	49	48	5
Picloram	0.5	97	69	56	35	0
Picloram	0.67	100	77	57	49	31
Picloram+2,4-D	0.2+0.4	92	48	28	42	5
Dicamba	1.33	92	75	60	30	1
Glyphosate	1.5	93	76	72	43	44
LSD (0.05)		9	35	38	16	26

All treatments provided 92% or better leafy spurge control when evaluated in June 1983 but control declined rapidly thereafter. The addition of 2,4-D to picloram did not improve leafy spurge control compared to picloram applied alone. Glyphosate at 1.5 lb/gal and picloram at 0.67 lb/gal provided the best long term control, but retreatment would have been necessary for both treatments by 1984. Leafy spurge control was better from all treatments than would have been expected if similar treatments had been applied in an open field. Reinfestation from seedlings was minimal even in the glyphosate treated plots. Grass injury was still very evident in plots treated with glyphosate 24 months following application. No visible tree injury resulted from any treatment. (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.)

Forage utilization by cattle in various densities of leafy spurge.

Lym, Rodney G. and Donald R. Kirby. An experiment to evaluate forage utilization by cattle in various densities of leafy spurge was begun in 1984 and continued in 1985 near Leonard, ND. The 300 A pasture carried 80 cow-calf pairs from May until mid-October. Caged plots were established on 23 April 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 with four replications. Picloram at 1.0 lb/A was applied on 10 June to establish the zero density areas. Production was harvested on 12 July or 4 October 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 was determined by comparing total production harvested in July with that remaining in October in eight 0.25 m^2 caged plots located adjacent to the experimental site.

Leafy spurge density	Leafy spurge	Yield							Disappearance		
		Leafy spurge	Caged			Uncaged			Total	Utilization[a]	Mean[b]
			Cool	Warm	Total	Cool	Warm	Total			
(% cover)	(stems/ft^2)	(lb/A)							(%)		
July harvest											
0 (zero)	0	0	749	186	949	670	73	750	22	..	..
20-40 (low)	10	172	385	181	565	364	160	529	6	..	..
40-80 (moderate)	34	341	530	161	713	520	154	678	5	..	..
80-100 (high)	55	951	697	193	895	604	216	824	7	..	..
LSD (0.05)	7	239	228	129	283	228	129	283			
October harvest											
0 (zero)	..	0	1128	327	1456	360	65	425	69	57	44
20-40 (low)	..	127	593	265	858	293	76	319	63	51	43
40-80 (moderate)	..	184	745	154	931	418	88	509	39	27	24
80-100 (high)	..	550	918	142	1063	584	65	650	31	19	10
LSD (0.05)		112	290	122	324	290	122	324	24		

[a] Estimate of utilization by cattle based on: Total disappearance - natural disappearance (12%).

[b] Average of 1985 and 1984 studies.

Forage availability was similar in all densities of leafy spurge in July, but was lower in all densities except the zero density by October. Leafy spurge decreased warm-season grass production much more than cool and the decrease was greater with increasing leafy spurge density. Total disappearance was 22% in July in areas with zero leafy spurge infestation but was only 6% when averaged over all other densities. Visual observation indicated that most of the disappearance in the higher densities of leafy spurge was due to trampling. Thus, most of the grazing from April until mid-July was in uninfested portions of the pasture.

Total disappearance and utilization increased in all densities of leafy spurge in October compared to July. Cattle utilized an average of 54% of the total forage produced in the zero and low density leafy spurge infestations, but only 27 and 19% in the moderate and high density infestations, respectively. These data were similar to the results in 1984, except utilization was higher in all infestations in 1985 when compared to 1984. The high utilization was probably due to over-stocking (animals/area for a given time). Utilization would probably have been much less if the pasture had not been overgrazed especially in the moderate and dense leafy spurge infested areas since the cattle did not graze these areas until the last half of the growing season.

Mowing as a pretreatment for leafy spurge control with herbicides. Lym, Rodney G. and C. 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 vigorous regrowth and may start to flower and set seed in the fall, 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. Leafy spurge was 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. Leafy spurge was 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-mounted 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 visual estimate of percent stand reduction as compared to the control.

Leafy spurge control with picloram applied 16 and 35 days after mowing was similar to control of unmowed plants in Experiment 1 (Table). However, control 9 months after application was only 42% when picloram was applied 9 days after mowing, probably due to the limited leafy spurge regrowth for foliar absorption of picloram. 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 at 9 months following application. However, 15 months after treatment control was 60 and 55% when picloram at 1.0 lb/A was applied 51 days after mowing or on unmowed plants, respectively, but only 13 and 25% when application was made 35 and 16 days after mowing, respectively. 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 during the first year of the experiment. In general, leafy spurge control was not improved by a mowing pretreatment regardless of the mowing or herbicide application date and tended to decline if herbicides were applied earlier than 35 days after mowing. (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.)

Table. Leafy spurge control with picloram and 2,4-D applied on several dates in 1983 following mowing as a pretreatment.

Treatment	Rate	Days after mowing	Control 1984 June	1984 August	1985 June
	(lb/A)		------------(%)---------		
Experiment 1 (mowed 2 Aug 83)					
Mow + picloram (11 Aug)	1.0	9	42	6	8
Mow + 2,4-D (11 Aug)	2.0	9	3	5	2
Mow + picloram (18 Aug)	1.0	16	94	27	28
Mow + 2,4-D (18 Aug)	2.0	16	6	8	1
Mow + picloram (6 Sept)	1.0	35	88	25	20
Mow + 2,4-D (6 Sept)	2.0	35	29	6	2
Picloram (6 Sept)	1.0	..	97	30	13
2,4-D (6 Sept)	2.0	..	31	3	0
Mow only	...	..	7	0	0
LSD (0.05)			23	12	11
Experiment 2 (treated 22 Sept 83)					
Mow (2 Aug) + picloram	1.0	51	96	22	60
Mow (2 Aug) + 2,4-D	2.0	51	33	14	10
Mow (18 Aug) + picloram	1.0	35	91	30	13
Mow (18 Aug) + 2,4-D	2.0	35	18	2	0
Mow (6 Sept) + picloram	1.0	16	94	17	25
Mow (6 Sept) + 2,4-D	2.0	16	1	0	0
Mow (2 Aug 83)	...	..	5	2	3
Mow (18 Aug 83)	...	..	5	5	0
Mow (6 Sept 83)	...	..	3	4	3
Picloram	1.0	..	99	21	55
2,4-D	2.0	..	10	6	0
LSD (0.05)			16	8	18

Dikegulac in combination with 2,4-D and picloram for leafy spurge control. Lym, Rodney G. and C. G. Messersmith. Previous studies have shown dikegulac (the sodium salt of dikegulac, tradename Atrinal by Maag Agrochemicals, Vero Beach, Florida) to be synergistic with 2,4-D and picloram for leafy spurge control. Dikegulac causes temporary inhibition of plant growth, reduction or elimination of flowering and promotion of axillary plant growth. Leafy spurge response to dikegulac decreases as the plant matures. The purpose of these experiments was to evaluate the synergism of dikegulac 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 plots were 10 by 30 ft, 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 visual percent stand reduction as compared to the control.

Dikegulac at 0.5, 1.0 and 2.0 lb/A was applied alone and 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 alone at one month after application were stunted and had many axillary branches, and most flowers had been aborted. In general, the number of axillary branches increased as the dikegulac rate increased. By the end of the growing season, plants treated with dikegulac 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 (Table 1). Leafy spurge control was 19 and 26% at 15 and 29 months following application of picloram at 1.0 lb/A, respectively, but was 73 and 61%, respectively, when averaged across the tank mixtures of dikegulac at 0.5, 1.0, or 2.0 lb/A. Dikegulac 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 was applied as a tank mix or split treatment with picloram and 2,4-D in the second experiment. Dikegulac 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. The leafy spurge was in the true flower growth stage and beginning seed set. Dikegulac had no observable effect on leafy spurge when applied on 26 May 1983. However, leafy spurge control with picloram at 1.0 lb/A increased slightly when dikegulac 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.

The third experiment was similar to the second experiment with dikegulac 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. Leafy spurge was under moisture stress on 7 September, and the plants were red and yellow with slight frost damage by 4 October. Dikegulac 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 had plant growth regulator activity on leafy spurge only early in the growing season. Thus, an experiment was begun in 1984 in a pasture near Hunter, ND, to evaluate various combination treatments of picloram and dikegulac applied early in the growing season for leafy spurge control. Treatments were applied either on 10 May when leafy spurge was 4 to 6 inches tall and in the vegetative growth stage, or on 22 May when the plants were 12 to 14 inches tall with yellow bracts but not yet flowering. The experimental design and application methods were similar to those previously described.

Leafy spurge control following early spring application of picloram plus dikegulac was inconsistent (Table 4). Leafy spurge plants treated with dikegulac alone in 1984 were less stunted and had fewer axillary branches compared to similar treatments in 1982. Leafy spurge control tended to increase when dikegulac was applied with picloram at 0.5 lb/A compared to picloram alone. However, control was similar or tended to decline when dikegulac was applied with picloram at 0.75 or 1.0 lb/A.

Although there is a tendency for leafy spurge control to be improved from low rates of picloram plus dikegulac compared to picloram alone, this increase is not as great as when 2,4-D is added to picloram. Also, 2,4-D is more economical than dikegulac as a combination treatment with picloram for leafy spurge control. (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.)

Table 1. Leafy spurge control by 2,4-D or picloram applied alone or with dikegulac on 26 May 1982 near Lisbon, ND.

Treatment	Rate	Control 1983 1 June	Control 1983 22 August	Control 1984 5 June	Control 1984 5 October
	(lb/A)	(%)			
Dikegulac + picloram	0.5+1.0	92	70	64	60
Dikegulac + picloram	0.5+2.0	100	90	68	63
Dikegulac + picloram	1.0+1.0	91	60	76	61
Dikegulac + picloram	1.0+2.0	100	83	87	85
Dikegulac + picloram	2.0+1.0	96	68	78	73
Dikegulac + picloram	2.0+2.0	99	94	90	89
Dikegulac + 2,4-D	0.5+2.0	15	3	3	3
Dikegulac + 2,4-D	1.0+2.0	15	3	0	0
Dikegulac + 2,4-D	2.0+2.0	2	0	0	0
Dikegulac	0.5	1	0	0	0
Dikegulac	1.0	0	0	0	0
Dikegulac	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 by 2,4-D or picloram applied with dikegulac as a pretreatment or tank mix near Lisbon, ND.

Treatment	Rate	1982 Application date	Control 1983 1 June	Control 1982 22 August
	(lb/A)		(%)	
Dikegulac	0.5	30 June	0	0
Dikegulac	1.0	30 June	7	0
Picloram	1.0	30 June	90	9
2,4-D	1.0	30 June	14	0
Dikegulac+picloram (split)	0.5+1.0	26 May/30 June	94	19
Dikegulac+picloram (split)	1.0+1.0	26 May/30 June	92	16
Dikegulac+picloram (tank mix)	0.5+1.0	30 June	95	18
Dikegulac+picloram (tank mix)	1.0+1.0	30 June	82	9
Dikegulac+2,4-D (split)	0.5+1.0	26 May/30 June	4	0
Dikegulac+2,4-D (split)	1.0+1.0	26 May/30 June	4	0
Dikegulac+2,4-D (tank mix)	0.5+1.0	30 June	1	0
Dikegulac+2,4-D (tank mix)	1.0+1.0	30 June	9	0
LSD (0.05)			14	10

Table 3. Leafy spurge control by 2,4-D or picloram applied with dikegulac as a pretreatment or tank mix near Lisbon, ND.

Treatment	Rate	1982 Application date	Control 1 June 1983	Control 22 August 1983
	(lb/A)		(%)	
Dikegulac+picloram (tank mix)	0.5+1.0	7 Sept	72	1
Dikegulac+picloram (tank mix)	1.0+1.0	7 Sept	52	4
Dikegulac+picloram (split)	0.5+1.0	7 Sept/4 Oct	47	0
Dikegulac+picloram (split)	1.0+1.0	7 Sept/4 Oct	64	8
Dikegulac+2,4-D (tank mix)	0.5+2.0	7 Sept	2	0
Dikegulac+2,4-D (tank mix)	1.0+2.0	7 Sept	2	0
2,4-D	2.0	7 Sept	4	0
Picloram	1.0	7 Sept	57	8
LSD (0.05)			20	3

Table 4. Leafy spurge control by picloram and dikegulac tank mix treatments applied near Hunter, ND.

Treatment	Rate	Application date/control: 10 May 84, Aug 1984	10 May 84, May 1985	22 May 84, Aug 1984	22 May 84, May 1985
	(lb/A)	(%)			
Dikegulac	0.25	0	0	1	0
Dikegulac	0.5	1	0	1	0
Dikegulac	1.0	1	2	0	0
Picloram	0.5	16	4	38	14
Picloram	0.75	53	7	31	49
Picloram	1.0	69	68	56	75
Dikegulac+picloram	0.25+0.5	32	16	38	28
Dikegulac+picloram	0.25+0.75	37	1	70	36
Dikegulac+picloram	0.25+1.0	43	0	81	36
Dikegulac+picloram	0.5+0.5	55	18	37	18
Dikegulac+picloram	0.5+0.75	51	31	55	44
Dikegulac+picloram	0.5+1.0	80	67	60	69
Dikegulac+picloram	1.0+0.5	24	5	24	1
Dikegulac+picloram	1.0+0.75	24	6	30	35
Dikegulac+picloram	1.0+1.0	50	36	48	43
LSD (0.05)		34	28	35	35

<u>Absinth wormwood control with clopyralid and picloram</u>. Lym, Rodney G. and C. G. Messersmith. Absinth wormwood (<u>Artemisia absinthium</u> L.) is a perennial forb that regrows from a root crown each year. The plant causes economic losses by reducing available forage, tainting the milk of cattle that graze it, and medically as a pollen source for allergies and asthma. The plant is most often found on dry soils, in overgrazed pasture and rangeland, wastelands and roadsides. The purpose of this research was to evaluate low rates of clopyralid and picloram for absinth wormwood control.

The experiment was established near Enderlin, ND, on 18 June 1984. The herbicides were applied using a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The plots were 10 by 30 ft in a randomized complete block design with four replications. The plants were 4 to 20 inches tall and in the bud growth stage. Evaluations are based on a visual evaluation of percent stand reduction as compared to the control.

		Control/evaluation date		
		1984	1985	
Treatment	Rate	20 August	29 May	20 August
	(lb/A)	(%)		
Clopyralid	0.125	33	69	69
Clopyralid	0.1875	48	92	88
Clopyralid	0.25	73	99	95
Clopyralid+2,4-D	0.125+0.5	75	97	96
Clopyralid+2,4-D	0.1875+0.75	87	99	97
Clopyralid+2,4-D	0.25+1.0	84	100	92
Picloram	0.125	83	92	84
Picloram	0.1875	66	97	96
Picloram	0.25	90	100	95
LSD (0.05)		26	12	17

Absinth wormwood control was higher when evaluated 12 and 15 months following application than after 3 months regardless of treatment. Previous research at North Dakota State University has shown that absinth wormwood is controlled by relatively low rates of dicamba and picloram but the plant dies very slowly. Picloram and clopyralid at 0.25 lb/A both provided 85% absinth wormwood control in August 1985 but picloram provided better control than clopyralid when applied at 0.125 and 0.1875 lb/A. Clopyralid + 2,4-D at 0.125 + 0.5 lb/A or 0.1875 + 0.75 lb/A tended to provide better control than clopyralid alone, and was similar to clopyralid or picloram at 0.25 lb/A alone. (Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Russian and spotted knapweed control by several herbicides in North Dakota. Lym, Rodney G. and Calvin G. Messersmith. Several experiments were established statewide in 1984 and 1985 to evaluate various herbicides for control of Russian and spotted knapweed. All experiments were in a randomized complete block design with four replications and 10 by 30 ft plots. The herbicides were applied using a tractor-mounted sprayer at 8.5 gpa and 35 psi. Evaluations were based on visual percent stand reduction as compared to the control.

The Russian knapweed control experiments were established near Williston, ND, on 30 June 1984 on an old mining site with a well established infestation. The plants were 18 to 24 inches tall, in the bud growth stage and growing under drought conditions. Clopyralid at 1 and 2 lb/A, dicamba at 4 lb/A and picloram at 1 lb/A all gave 100% Russian knapweed control 12 months following application in the first experiment (Table). Picloram at 0.25 lb/A gave only 68% Russian knapweed control, but provided 93% control when combined with 2,4-D at 1 lb/A. Glyphosate did not provide satisfactory control. The second experiment compared triclopyr and clopyralid alone and combined with 2,4-D for Russian knapweed control. Triclopyr at 2 lb/A gave 82% control and control was not increased with the addition of 2,4-D. Russian knapweed control with relatively low rates of clopyralid was inconsistent. Clopyralid at 0.125 and 0.25 lb/A provided 61 and 19% control, respectively. Low rates of picloram and clopyralid combined with 2,4-D gave good Russian knapweed control in the third experiment. All treatments resulted in 84% or better Russian knapweed control except picloram plus 2,4-D at 0.125 + 1 lb/A which provided only 34% control.

Spotted knapweed control experiments were established at Marmarth and Pekin in western and eastern North Dakota, respectively. The first experiment at Marmarth was begun on 13 September 1984 when the plants were in the rosette growth stage, and the second experiment was established on 20 June 1985 with the plants 6 to 37 inches tall and in the bud growth stage. The experiment at Pekin was established on 11 July 1985 when the plants were 3 to 4 feet tall and beginning to flower. Clopyralid at 0.5 and 1 lb/A, dicamba at 2 lb/A, picloram at 1 lb/A and picloram plus 2,4-D at 0.25 + 1 lb/A provided excellent initial spotted knapweed control. There was a general increase in control for the fall applied treatments at 12 months compared to 9 months following application. Dicamba and glyphosate at 1 lb/A did not provide satisfactory spotted knapweed control. Spotted knapweed control with fluroxypyr was inconsistent when evaluated 1 to 3 months after application. In general, relatively low rates of clopyralid, dicamba and picloram alone or combined with 2,4-D provided excellent Russian and spotted knapweed control. 2,4-D, glyphosate and triclopyr either provided unacceptable knapweed control or application rates for satisfactory control were uneconomical. (Published with the approval of the Agric. Exp. Stn., North Dakota State Univ., Fargo.)

Table. Russian and spotted knapweed control from various herbicides at several locations in North Dakota.

Treatment	Rate	Russian knapweed/Williston 6 June 1985			Spotted knapweed/site/evaluation date			
					Marmarth (13 Sept 84)		Marmarth (20 June 85)	Pekin (11 July 85)
		Exp. 1	Exp. 2	Exp. 3	5 June 85	19 Sept 85	19 Sept 85	26 Aug 85
	(lb/A)	(%)						
2,4-D	1.0	5	...	...	0	15	...	...
2,4-D	2.0	0	...	...	...	...	...	...
2,4-D	4.0	0	...	...	...	...	...	...
2,4-DB	2.0	0	...	...	...	...	...	...
Picloram	0.25	68	...	...	46	80	55	64
Picloram	0.5	...	...	...	...	...	78	92
Picloram	1.0	100	...	...	99	98	...	...
Picloram+2,4-D	0.125+1.0	...	...	34	...	...	...	...
Picloram+2,4-D	0.188+1.0	...	...	86	...	...	...	...
Picloram+2,4-D	0.25+1.0	93	...	...	69	100	94	86
Picloram+2,4-D	0.5+1.0	97	...	91	...	...	...	...
Dicamba	1.0	...	...	...	41	79	...	...
Dicamba	2.0	43	...	...	86	100	100	99
Dicamba	4.0	100	...	...	...	...	...	...
Triclopyr	1.0	...	54	...	...	...	...	...
Triclopyr	2.0	...	82	...	...	...	...	...
Triclopyr+2,4-D	1.0+1.0	...	28	...	...	...	...	...
Triclopyr+2,4-D	2.0+1.0	...	70	...	...	...	...	...
Glyphosate	1.0	61	...	...	3	23	50	83
Glyphosate	3.0	74	...	...	...	...	...	...
Clopyralid	0.125	...	61	...	...	...	...	...
Clopyralid	0.188	...	38	...	...	...	...	...
Clopyralid	0.25	91	19	...	43	70	...	...
Clopyralid	0.5	...	...	...	...	...	99	95
Clopyralid	1.0	100	...	...	90	100	...	...
Clopyralid	2.0	100	...	...	...	...	...	...
Clopyralid+2,4-D	0.125+0.5	...	45	...	...	...	...	...
Clopyralid+2,4-D	0.2+0.8	...	59	...	...	...	...	...
Clopyralid+2,4-D	0.25+1.0	...	83	84	...	...	93	99
Clopyralid+2,4-D	0.5+1.0	...	...	96	...	...	...	...
Fluroxypyr	1.0	...	...	...	...	...	99	68
LSD (0.05)		41	43	19	30	41	33	9

Post-harvest herbicide application for perennial sowthistle control. Messersmith, Calvin G. and Rodney G. Lym. Post-harvest frequently is the most opportune time for farmers to treat perennial sowthistle either with non-selective herbicides or with higher herbicide rates than can be used in a growing crop. Three experiments were established in barley stubble on September 19, 1984 near Devils Lake, ND. Most of the perennial sowthistle had 4- to 10-leaf rosettes, but a few had 6- to 10-inch stems with buds or flowers. Experiments were established in a randomized complete block design with four replications, and plots were 10 by 30 feet. Treatments were applied with a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The one exception was Experiment Two where treatments were applied on a second date, October 8, 1984, with a back-pack sprayer at 17 gpa. The perennial sowthistle had been severely frosted before October 8 and the remaining healthy-appearing plants were mostly 4- to 6-leaf rosettes. The experiments were evaluated visually on June 20 and July 25, 1985 for percent perennial sowthistle control based on reduction of weed density compared to the control and for percent of the barley crop injured by herbicide residues.

Complete topgrowth control of perennial sowthistle was obtained with all treatments in Experiment One (Table). However, all treatments that included picloram caused unacceptable injury to the barley crop. Clopyralid resulted in slight visible injury on June 20, but injury was not visible on July 25 which was immediately prior to barley harvest.

Dicamba at 1 lb/A in Experiment Two whether alone or with glyphosate provided approximately 50% perennial sowthistle control with only minor injury to barley (Table). Dicamba at 2 lb/A provided the best perennial sowthistle control in this experiment, but the barley injury was unacceptable. Clopyralid at 0.25 to 0.5 lb/A provided control similar to dicamba at 1 lb/A and did not cause visible crop injury. Glyphosate and chlorsulfuron provided inadequate perennial sowthistle control, and chlorsulfuron caused too much crop injury.

Perennial sowthistle control tended to improve when 2,4-D was added to clopyralid compared to clopyralid alone in Experiment Three (Table). Generally triclopyr provided similar perennial sowthistle control whether applied alone or with 2,4-D. None of these treatments caused visible crop injury.

Treatments that provided complete perennial sowthistle control were not acceptable due to severe barley injury. The variability was high among treatments when complete control was not obtained. However, some clopyralid, dicamba, and triclopyr treatments provided an intermediate level of perennial sowthistle control without barley injury, and may be acceptable in a repeat treatment program.

Post-harvest perennial sowthistle control (Messersmith and Lym)

Treatment	Rate	1984 date applied	June 20, 1985 Control	June 20, 1985 Injury	July 25, 1985 Control	July 25, 1985 Injury
	lb/A		-------(%)-------		-------(%)-------	
Experiment One						
Picloram	0.25	Sept 19	100	23	100	16
Picloram	0.5	Sept 19	100	28	100	29
Picloram	1.0	Sept 19	100	55	100	63
Picloram + 2,4-D	0.25 + 1.0	Sept 19	100	21	100	18
Picloram + 2,4-D	0.5 + 1.0	Sept 19	100	39	100	38
Clopyralid	1.0	Sept 19	97	1	99	0
Clopyralid	2.0	Sept 19	100	4	100	0
LSD (0.05)			3	13	1	21
Experiment Two						
Dicamba + WK surfactant	1.0 + 0.5%	Sept 19	43	3	58	2
Dicamba + WK surfactant	2.0 + 1.0%	Oct 8	50	3	57	8
Dicamba + WK surfactant	2.0 + 0.5%	Sept 19	75	12	88	12
Dicamba + WK surfactant	4.0 + 1.0%	Oct 8	87	37	93	38
Glyphosate	0.75	Sept 19	31	0	50	3
Glyphosate	1.5	Oct 8	3	0	22	0
Glyphosate	1.5	Sept 19	19	0	31	1
Glyphosate	3.0	Oct 8	8	0	7	0
Clopyralid	0.25	Sept 19	43	0	44	0
Clopyralid	0.5	Oct 8	45	0	58	0
Dicamba + glyphosate	0.25 + 0.75	Sept 19	41	0	60	0
Dicamba + glyphosate	0.5 + 1.5	Oct 8	34	1	54	0
Dicamba + glyphosate	0.5 + 0.5	Sept 19	62	0	74	1
Dicamba + glyphosate	1.0 + 1.0	Oct 8	45	1	58	1
Chlorsulfuren	0.0313	Sept 19	21	26	46	14
LSD (0.05)			33	7	38	9
Experiment Three						
Clopyralid	0.125	Sept 19	14	0	30	0
Clopyralid	0.1875	Sept 19	34	0	57	0
Clopyralid	0.25	Sept 19	48	0	39	0
Clopyralid + 2,4-D	0.125 + 0.5	Sept 19	65	0	57	0
Clopyralid + 2,4-D	0.1875 + 0.75	Sept 19	55	0	60	0
Clopyralid + 2,4-D	0.25 + 1.0	Sept 19	58	0	69	0
Triclopyr	1.0	Sept 19	39	0	57	0
Triclopyr	2.0	Sept 19	55	0	69	0
Triclopyr + 2,4-D ester	1.0 + 1.0	Sept 19	49	0	63	0
Triclopyr + 2,4-D ester	2.0 + 1.0	Sept 19	54	0	64	1
LSD (0.05)			34	--	41	NS

Perennial sowthistle control in wheat with experimental herbicides. Messersmith, Calvin G. and Rodney G. Lym. Herbicides that provide both annual and perennial weed control with one application are more cost effective than treatments that require separate applications. Several experimental herbicides were applied in two experiments at the Langdon Experiment Station on June 5, 1985 to Coteau wheat in the 3- to 5-leaf stage with some plants tillering. The wheat density at this field border site was not uniform enough to harvest for yield. The perennial sowthistle plants varied from just emerging to rosettes with 6 to 8 leaves. Experiments were established in a randomized complete block design with four replications, and plots were 8 by 20 feet. Treatments were applied with a tractor-mounted sprayer delivering 8.5 gpa at 35 psi. The experiments were evaluated visually on June 20 and July 25, 1985 for percent perennial sowthistle control based on reduction of weed density compared to the control and for percent injury to wheat.

DPX-L5300 and DPX-T6376 controlled wild mustard and provided an intermediate level of perennial sowthistle control when evaluated on June 20, 1985 (Table). Perennial sowthistle control had increased for each herbicide by the July 25, 1985 evaluation. DPX-T6376 treated wheat plants had slight visible injury when evaluated on June 20, 1985, but injury was not visible by July 25, 1985.

Clopyralid provided approximately 50% perennial sowthistle control on June 20, but control increased to approximately 75% by July 25 (Table). Fluroxypyr provided less perennial sowthistle control than clopyralid. Perennial sowthistle control was not improved by adding 2,4-D amine to either clopyralid or fluroxypyr. Picloram and dicamba caused some wheat injury and tended to be less effective than clopyralid for perennial sowthistle control. The wheat was in the correct stage for picloram application, but picloram was applied above the labeled use rates of 0.25 to 0.375 oz/A. Some wheat plants were past the optimum stage for dicamba application, plus the 4 oz/A rate was above the highest labeled rate in wheat of 2 oz/A. The 2,4-D amine treatment provided an intermediate level of perennial sowthistle control.

DPX-L5300, DPX-T6376, and clopyralid provided acceptable perennial sowthistle control through wheat harvest time without visible wheat injury that would adversely affect yield. The variability among treatments was high, so follow-up evaluations in 1986 plus additional experiments will be required to obtain a better understanding of the effect of these herbicides on established perennial sowthistle plants.

Experimental herbicides on perennial sowthistle (Messersmith and Lym)

Treatment	Rate	June 20, 1985 control Pest	June 20, 1985 control Wimu	June 20, 1985 Injury	July 25, 1985 Pest	July 25, 1985 Injury
	(oz/A)	----------	----------	(%)	----------	----------
Experiment 1						
DPX-L5300	0.125	31	100	0	55	0
DPX-L5300	0.25	51	100	0	76	0
DPX-L5300	0.5	48	98	0	63	0
DPX-T6376	0.06	29	100	4	75	0
DPX-76376	0.125	45	100	1	79	0
LSD (0.05)		25	2	5	25	NS
Experiment 2						
Clopyralid	4	42		0	83	0
Clopyralid	8	53		1	74	0
Clopyralid + 2,4-D[a]	4 + 16	55		0	73	1
Fluroxypyr	4	17		0	24	0
Fluroxypyr	8	22		0	15	0
Fluroxypry + 2,4-D[a]	4 + 16	60		0	37	3
Picloram	1	4		1	21	8
Picloram	2	8		5	57	17
Dicamba	2	7		3	31	2
Dicamba	4	21		13	66	6
2,4-D amine[a]	8	18		0	40	1
2,4-D amine[a]	16	38		0	52	2
LSD (0.05)		27		4	45	5

[a] alkanolamine

Antagonism of diclofop by MCPA & 2,4-D, Fargo 1985. 'Marshall' wheat, `Moore' oats, and Siberian millet were seeded in adjacent strips 6 ft wide as bioassay species on May 24. Treatments were applied to four leaf species on June 25. Evaluation of species response was 2 and 5 weeks after treatment. The data for the two evaluations were combined. Each formulation, dimethyl amine (dma) and butoxyethonal ester (bee), of MCPA and 2,4-D were seperate experiments in the same area. The experiments were randomized complete blocks with four replications. Only the data for oats and millet are presented as the wheat was not injured by diclofop.

Phenoxy	Diclofop Rate	Species	Rate of phenoxy herbicide 0	2	4	6	avg
	(oz/A)		-------(% control)-------				
2,4-Ddma	8	Millet	56	32	19	21	32
2,4-Ddma	12	Millet	75	34	36	29	43
2,4-Ddma	16	Millet	75	52	41	41	52
2,4-Ddma	20	Millet	84	68	62	48	65
2,4-Ddma	24	Millet	81	75	50	65	68
average			74	52	42	41	
2,4-Ddma	8	Oats	45	24	22	11	26
2,4-Ddma	12	Oats	51	32	27	24	34
2,4-Ddma	16	Oats	62	43	39	27	43
2,4-Ddma	20	Oats	56	58	55	43	53
2,4-Ddma	24	Oats	68	64	44	44	55
average			56	44	37	30	

LSD 5% Diclx2,4-D rate:Mill=13,Oats=13;2,4-D rate:Mill=6, Oats=6;Dicl rate:Mill=6,Oats=6.

Phenoxy	Diclofop Rate	Species	0	2	4	6	avg
2,4-Dbee	8	Millet	66	34	21	29	37
2,4-Dbee	12	Millet	66	51	41	24	45
2,4-Dbee	16	Millet	86	67	54	43	63
2,4-Dbee	20	Millet	91	61	67	73	71
2,4-Dbee	24	Millet	91	73	61	72	74
average			80	57	49	46	
2,4-Dbee	8	Oats	48	34	17	23	31
2,4-Dbee	12	Oats	54	32	41	27	38
2,4-Dbee	16	Oats	61	59	43	29	48
2,4-Dbee	20	Oats	76	46	54	48	56
2,4-Dbee	24	Oats	79	61	52	56	62
average			64	46	41	37	

LSD 5% Diclx2,4-D rate:Mill=11,Oats=10;2,4-D rate:Mill=5, Oats=5;Dicl rate:Mill=6,Oats=5.

Phenoxy	Diclofop Rate	Species	Rate of phenoxy herbicide 0	2	4	6	avg
	(oz/A)		-------(% control)-------				
MCPAdma	8	Millet	57	37	20	30	36
MCPAdma	12	Millet	71	52	26	46	49
MCPAdma	16	Millet	82	69	57	54	66
MCPAdma	20	Millet	83	67	61	47	64
MCPAdma	24	Millet	93	78	70	70	78
average			77	61	47	49	
MCPAdma	8	Oats	42	25	19	22	27
MCPAdma	12	Oats	64	38	20	29	38
MCPAdma	16	Oats	72	56	44	35	52
MCPAdma	20	Oats	64	62	51	37	54
MCPAdma	24	Oats	81	64	57	46	62
average			65	49	38	34	

LSD 5% DiclxMCPA rate:Mill=11,Oats=11;MCPA rate:Mill=5, Oats=5;Dicl rate:Mill=5,Oats=5.

Phenoxy	Diclofop Rate	Species	0	2	4	6	avg
MCPAbee	8	Millet	70	54	45	42	53
MCPAbee	12	Millet	75	61	58	46	60
MCPAbee	16	Millet	82	70	55	66	68
MCPAbee	20	Millet	89	76	68	57	73
MCPAbee	24	Millet	92	85	67	67	78
average			82	69	59	56	
MCPAbee	8	Oats	51	33	29	26	35
MCPAbee	12	Oats	60	49	37	29	44
MCPAbee	16	Oats	62	58	46	49	54
MCPAbee	20	Oats	71	62	56	43	58
MCPAbee	24	Oats	71	67	52	55	61
average			63	54	44	40	

LSD 5% DiclxMCPA rate:Mill=9,Oats=9;MCPA rate;Mill=4, Oats=4;Dicl rate:Mill=4,Oats=4.

Summary

Species control with diclofop was generally antagonized more by the amine formulation than the ester for both 2,4-D and MCPA. Increasing the rate of diclofop compensated for the antagonism from the phenoxy herbicide. However, species control was reduced by the phenoxy herbicide at 2 oz/A even with diclofop at 24 oz/A. 2,4-D was generally more antagonistic than MCPA to species control with diclofop.

<u>Diclofop antagonism and oil volume, Fargo 1985.</u> 'Moore' oats, 'Marshall' wheat and Siberian foxtail millet were seeded in six foot wide adjacent strips on June 7. Treatments were applied to four leaf species on July 1. The oil additive was petroleum oil with 17% AT Plus 300F. The MCPA and 2,4-D were applied at 4 oz/A and were the dimethyl amine (dma) and the butoxyethonal ester (bee). Evaluation was about 2 and 4 weeks after treatment and the two evaluations were combined. None of the treatments injured wheat so the data was not included. The experiment was a randomized complete block with a factorial arrangement of treatments and had three replications.

Dicl (oz/A)	Phenoxy	Species	Oil volume, Pt/A 0	0.5	1	2	avg
			---------(% control)----------				
8	None	Oats	46	77	77	80	
12	None	Oats	72	87	68	88	
average			59	82	72	84	74
8	None	Millet	62	81	82	82	
12	None	Millet	82	92	75	87	
average			72	87	79	85	81
species average			65	84	75	84	77
8	MCPAdma	Oats	23	46	42	37	
12	MCPAdma	Oats	56	55	53	44	
average			40	50	47	41	45
8	MCPAdma	Millet	34	59	57	57	
12	MCPAdma	Millet	53	78	58	61	
average			44	69	58	59	57
species average			42	59	53	50	51
8	MCPAbee	Oats	31	35	39	34	
12	MCPAbee	Oats	56	50	52	47	
average			43	42	46	41	43
8	MCPAbee	Millet	38	57	54	44	
12	MCPAbee	Millet	60	67	77	64	
average			49	62	66	54	58
species average			46	52	55	48	50

Dicl	Phenoxy	Species	Oil volume, Pt/A 0	0.5	1	2	avg
(oz/A)			----------(% control)----------				
8	2,4-Ddma	Oats	30	29	28	31	
12	2,4-Ddma	Oats	33	30	32	40	
average			31	30	30	35	32
8	2,4-Ddma	Millet	15	31	31	27	
12	2,4-Ddma	Millet	26	37	30	42	
average			20	34	30	35	30
	species average		26	31	30	35	31
8	2,4-Dbee	Oats	45	42	47	55	
12	2,4-Dbee	Oats	45	50	56	54	
average			45	46	51	55	49
8	2,4-Dbee	Millet	35	41	47	47	
12	2,4-Dbee	Millet	44	48	54	57	
average			40	45	51	52	47
	species average		43	45	51	53	48
	oil volume average		44	54	54	54	

LSD 5% OilxPhenxDicl:Oats=8.5,Millet=9.5
LSD 5% OilxPhen:Oats=8.4,Millet=6.5
LSD 5% OilxPhen over species=5.3 (EMS 12df Oats=89,Mill=54)
LSD 5% Oil vol over species=1.9 (EMS 3df Oats=19,Mill=27)

Summary

The oil additive at 0.5 to 2 pints/A with diclofop similarly enhanced phytotoxicity to oats and millet. The increased phytotoxicity to oats from the oil additive with diclofop did not always occur when the spray contained MCPA or 2,4-D amine or ester. The enhancement of phytotoxicity to millet by the oil additive with diclofop and MCPA or 2,4-D was less than when diclofop was applied alone with the oils. Both MCPA and 2,4-D amine and ester antagonized the control of oats and millet with diclofop. The amine of 2,4-D was more antagonistic than the ester to diclofop phytotoxicity. The MCPA amine and ester were similarly antagonistic to diclofop.

Fluazifop with oil percent and spray volume, Fargo 1985. 'Moore' oats, 'Marshall' wheat and Siberian foxtail millet were seeded in adjacent 6 ft wide strips as bioassay species on June 10. Treatments were applied to five leaf species on July 8. Fluazifop at 1.25 oz/A was applied in water at various volumes with various percentages petroleum oil with 17% AT Plus 300F (PO) as an additive. The experiment was a randomized complete block with three replications. Species control was evaluated about 2 and 4 weeks after treatment and only the average of the two evaluations is presented.

		Application method, nozzle					
PO	Species	8001 1X	8001 2X	8001 4X	8002 1X	8004 1X	avg
(%)		------------(% control)------------					
0	Wheat	90	78	83	87	62	79
0	Oats	68	38	53	54	32	49
0	Millet	32	19	20	18	10	20
	average	63	45	52	53	35	49
0.5	Wheat	96	87	86	93	85	87
0.5	Oats	88	64	80	80	75	78
0.5	Millet	49	40	51	46	42	45
	average	78	64	72	73	67	70
1	Wheat	95	88	95	93	90	92
1	Oats	83	75	87	79	70	79
1	Millet	45	32	45	48	44	43
	average	74	65	76	73	68	71
2	Wheat	94	92	96	97	74	91
2	Oats	86	73	93	83	53	78
2	Millet	43	35	49	43	33	41
	average	74	67	79	74	53	70
4	Wheat	98	70	96	94	93	90
4	Oats	84	55	94	81	81	79
4	Millet	36	25	30	42	27	32
	average	73	50	73	72	67	67
	Wheat average	95	83	91	93	81	
	Oats average	82	61	81	75	62	
	Millet average	41	30	39	39	31	
	Species average	73	58	70	69	58	

LSD 5% Oil%xVol=NS
LSD 5% Oil%:Wheat=NS,Oats=5,Millet=5.
LSD 5% Vol:Wheat=NS,Oats=5,Millet=NS.

Summary

The percentage petroleum oil additive in the spray mixture with fluazifop did not influence control of the species. Species control was similar when fluazifop was applied with 8001 nozzle in one or four passes and the 8002 nozzle. Fluazifop applied with the 8004 or twice with the 8001 nozzle gave lower control of the species than with other methods. The low control with two passes from an 8001 nozzle would not be expected. Possibly the second pass was not applied.

Sethoxydim with oil percent and spray volume, Fargo 1985. 'Moore' oats, 'Marshall' wheat, and Siberian millet were seeded in adjacent 6 ft wide strips as bioassay species on May 24. Treatments were applied to five leaf species on June 27. Sethoxydim at 1.5 oz/A was applied in water at various volumes with various percentages petroleum oil with 17% AT Plus 300F (PO) as an additive. The oils were mixed with the herbicides prior to the addition of the water to the spray container. The experiment was a randomized complete block with four relpications. Species control was evaluated about 2 and 4 weeks after treatment and the values were combined in the table.

		Application method,nozzle					
PO	Species	8001 1X	8001 2X	8001 4X	8002 1X	8004 1X	Avg
(%)		(% control)					
0	wheat	56	52	61	39	20	46
0	oats	62	59	77	41	23	52
0	millet	87	87	91	71	27	72
	average	68	66	76	50	23	57
0.5	wheat	61	59	63	55	49	57
0.5	oats	87	82	86	67	43	73
0.5	millet	97	97	96	95	78	92
	average	82	79	82	72	57	74
1	wheat	67	65	66	59	46	61
1	oats	92	88	89	72	49	78
1	millet	96	97	95	92	86	93
	average	85	83	83	74	60	77
2	wheat	69	64	66	62	49	62
2	oats	91	89	91	79	52	80
2	millet	98	96	97	96	86	95
	average	86	83	84	79	62	79
4	wheat	75	73	78	61	50	67
4	oats	91	91	95	69	58	81
4	millet	95	96	97	92	92	94
	average	86	87	90	74	67	81
	wheat average	66	63	67	55	43	
	oats average	84	82	88	66	45	
	millet average	94	95	95	89	74	
	species average	81	80	83	70	54	

LSD 5% vol x %oil; wheat=NS, oats=NS, millet=6
LSD 5% %oil; wheat=4, oats=3, millet=3
LSD 5% vol; wheat=4, oats=3, millet=3

Summary

Species control tended to increase as the percentage oil in the sethoxydim spray mixture increased. Sethoxydim gave similar control of the species regardless of the number of passes of an 8001 nozzle used to apply the treatment. Species control with sethoxydim decreased as the size of the orifice in the nozzle used for application increased.

<u>Various oil additives with grass control herbicides, Fargo 1985.</u> The same experiment was conducted twice. 'Moore' oats, 'Marshall' wheat and Siberian foxtail millet were seeded as bioassay species on May 5 for the first experiment and on June 10 for the second experiment. Treatments were applied to 4 to 5-leaf species on June 25 for the first experiment and to 7-leaf (jointing) species on July 15 for the second experiment. All oil additives contained 15% v/v At Plus 300F emulsifier and were applied at 1 quart/A. X-77 was applied at 0.25% v/v of the spray mixture. Each experiment was evaluated about 2 and 4 weeks after treatment. The data in the table is an average over the two experiments and two evaluations. Diclofop was at 12 oz/A in experiment 1 and 16 oz/A in experiment 2. PO = petroleum oil 11N, SF = once-refined sunflower oil, SFME = methylated sunflower oil, LO = linseed oil, SO = once refined soybean oil, and SoME = methylated soybean oil.

See next page for Table.

Summary

Species control with BAS-51702, sethoxydim, and cloproxydim was enhanced more by methylated sunflower and soybean oil than by petroleum oil or the seed oils alone. Unesterified seed oils were similiar to petroleum oil in enhancing species control with the above herbicides. The species control with the other herbicides was enhanced equally by petroleum oil and methylated sunflower or soybean oil, but these oils enhanced species control more than the parent unesterified seed oils. X-77 as an additive was similiar to the oils in enhanceing species control when with DPX-Y6002, fluazifop, and fenoxyprop. Linseed oil tended to be less effective than soybean or sunflower oil as an additive to both sethoxydim and fluazifop. DPX-Y6002 generally was less effective in controlling the species when applied with unesterified seed oils than when applied alone. The plants were growing rapidly because of adequate soil moisture and moderate temperature which may have accounted for the high effectiveness of X-77 compared to oils, when used with certain herbicides. The seed oils were all once-refined and from a supply obtained from Cargill in 1984.

Various oil additives with grass control herbicides.

Herbicide	Rate	Spp	Additive							
			None	PO	SF	SFME	LO	SO	SOME	X-77
	(oz/A)		(% control)							
BAS-51702	0.75	Wht	9	80	76	90	71	76	88	61
BAS-51702	0.75	Oat	45	96	95	99	92	93	98	80
BAS-51702	0.75	Mil	62	95	94	96	92	94	97	86
Average			37	90	88	95	85	88	94	76
Seth	1.50	Wht	40	73	70	83	64	66	77	55
Seth	1.50	Oat	40	80	81	91	70	80	89	60
Seth	1.50	Mil	73	91	89	94	89	90	93	83
Average			51	81	80	89	74	79	86	66
Clop	0.75	Wht	21	76	69	86	67	76	86	62
Clop	0.75	Oat	26	92	93	97	85	93	97	71
Clop	0.75	Mil	25	84	84	88	78	85	88	72
Average			24	84	82	90	77	85	90	68
Diclofop	12/16	Wht	0	0	0	0	0	0	0	0
Diclofop	12/16	Oat	31	38	35	38	33	35	44	39
Diclofop	12/16	Mil	49	75	67	67	54	70	74	61
Average			27	38	34	35	29	35	39	33
DPX-Y6202	0.50	Wht	79	92	53	91	34	46	86	89
DPX-Y6202	0.50	Oat	29	80	31	78	13	26	63	71
DPX-Y6202	0.50	Mil	25	79	24	75	15	28	58	63
Average			44	84	36	81	21	33	69	74
Fluazifop	1.00	Wht	82	89	86	85	76	82	86	87
Fluazifop	1.00	Oat	75	88	77	88	67	76	84	87
Fluazifop	1.00	Mil	32	64	52	62	41	52	45	49
Average			63	80	71	78	61	70	72	74
Feno	0.75	Wht	15	27	20	31	14	18	25	26
Feno	0.75	Oat	49	64	47	72	28	50	65	65
Feno	0.75	Mil	89	92	90	92	84	87	91	86
Average			51	61	52	65	42	52	60	59
Haloxyfop	0.50	Wht	30	83	68	88	68	70	85	70
Haloxyfop	0.50	Oat	32	89	68	95	70	76	92	77
Haloxyfop	0.50	Mil	15	80	64	83	68	74	82	53
Average			27	84	67	87	69	73	86	67
Average(Spp&Herb.)			40	75	64	78	57	64	75	65

LSD 5% AddxHerb; Wheat=6.1, Oats=7.4, Millet=8.6
LSD 5% Additive=3.7 (Pooled errors; Wheat=57, Oats=83, Millet=112)

Grass control herbicides with oils at various volumes, Fargo 1985. 'Moore' oats (Ot), 'Marshall' wheat (Wt), and Siberian foxtail millet (Mi) were seeded as bioassay species on June 12. Treatments were applied across the species which were in the five leaf stage, on July 9. Rating of visible injury were taken 2 and 4 weeks after treatment and the data presented as an average of the two evaluations. The petroleum oil contained 17% At Plus 300F (PO17AT) soybean oil 15% emulsifier from BASF (SO15BE) and methlated sunflower oil 15% At Plus 300F (SFME15AT). The experiment was a split plot with herbicides as the main effect and contained four replications.

See Table of data on next page

Summary

The data was averaged over evaluation dates eventhough some of the interactions involving dates were significant. The control of a species generally increased from the first to second evaluation when control was high and decreased when control was low. Thus, the averaged data should not influence the relative ranking of oil volume on species control. Further, the evaluation date by herbicide by oil volume interaction was not significant. Species control with sethoxydim increased as the volume of methylated sunflower or soybean oil increased but not with increasing volume of petroleum oil. However, species control with fluazifop increased as petroleum oil volume increased but not with increasing volume of methylated sunflower or with once-refined soybean oil. Species control with diclofop was not influenced by volume with any of the oils. The enhancement of species control by oil additives was less with diclofop than with sethoxydim or fluazifop. The phytotoxicity of sethoxydim was enhanced more by methylated sunflower oil than the petroleum oil or soybean oil additives, regardless of oil volume. Once-refined soybean oil was less effective than methylated sunflower oil or petroleum oil in enhancing fluazifop phytotoxicity. All three oils similiarly enhanced the phytotoxicity of diclofop.

Species control with oils at various volumes.

Herb.	Rate	Oil vol.	PO17AT Wh	Ot	Mi	X	SO15BE Wh	Ot	Mi	X	SFME15AT Wh	Ot	Mi	X
	(oz/A)	(Pt/A)	(% Control)											
Seth	1.00	0	13	12	49	25	26	17	57	33	9	15	52	25
Seth	1.00	0.5	52	44	87	61	44	40	80	55	57	51	89	66
Seth	1.00	1.0	56	54	87	65	48	41	85	58	60	63	91	71
Seth	1.00	2.0	54	47	86	62	47	53	88	63	81	83	93	86
Seth	3.00	0	46	43	86	58	51	54	86	64	53	51	84	63
Seth	3.00	0.5	91	93	98	94	81	86	93	87	93	93	98	95
Seth	3.00	1.0	90	90	98	93	72	79	91	81	76	83	93	84
Seth	3.00	2.0	91	93	97	94	91	92	97	93	95	97	98	97
Seth Average			62	60	86	69	58	58	85	67	66	67	87	73
Flua	0.75	0	62	26	24	37	65	24	18	36	68	18	12	33
Flua	0.75	0.5	77	51	40	56	72	34	31	46	85	65	46	65
Flua	0.75	1.0	77	56	42	58	63	31	26	40	84	66	44	65
Flua	0.75	2.0	86	58	42	62	73	32	18	41	87	69	42	66
Flua	2.25	0	92	94	55	80	90	91	52	78	91	92	50	78
Flua	2.25	0.5	96	96	77	90	91	94	52	80	94	97	67	86
Flua	2.25	1.0	96	98	79	91	92	94	62	83	92	96	78	88
Flua	2.25	2.0	96	98	73	89	93	95	62	83	96	98	76	91
Flua Average			85	72	54	70	80	62	40	61	87	75	52	72
Dicl	8.00	0	0	27	61	30	0	45	59	35	0	27	46	25
Dicl	8.00	0.5	0	36	63	33	0	42	66	36	0	48	71	40
Dicl	8.00	1.0	0	46	73	40	0	40	56	32	0	38	62	34
Dicl	8.00	2.0	0	43	75	40	0	41	69	37	0	46	68	38
Dicl	24.0	0	0	57	85	47	0	54	87	47	0	64	84	49
Dicl	24.0	0.5	0	62	88	50	0	64	87	50	2	66	87	52
Dicl	24.0	1.0	0	65	90	51	2	69	93	54	3	73	89	55
Dicl	24.0	2.0	2	60	89	50	0	64	88	51	2	69	87	53
Dicl Average			4	55	78	38	0	52	76	43	1	54	74	43

LSD 5% HerbxVolxOil = 7 8 8 7 8 8 7 8 8

LSD 5% Oils Wheat=1.2 Oats=1.4 Millet=1.4

LSD 5% HerbxVolxOil(Averaged over species) = 4.2 (Species errors were pooled; error wheat=44.5, oats=58.6, millet=56.4)

Oils with atrazine and cyanazine, Fargo 1985. 'Pioneer 3737' corn, 'Moore' oats, and Siberian foxtail millet and F1 sunflower was seeded on June 7. Treatments were applied to four leaf species on July 1. Petroleum oil 11N (PO) with 17% At Plus 300F (AT), once-refined soybean oil (SO) with 15% BASF (BE) emulsifier, and methylated sunflower oil (SM) with 15% AT all at 1 qt/A were applied with atrazine 4L and cyanazine 90DF. Evaluations were about 2 and 4 weeks after treatment. The experiment was a split plot with herbicide and rate as the main effect and contained four replications. The data presented are an average of the two evaluations and herbicide rates.

Herbicide	Oil	Corn injury	Species control		
			Cosf	Oats	Millet
		(%)	---------(%)--------		
Atrazine	POAT	6	83	60	27
Atrazine	SOBE	0	91	54	30
Atrazine	SMAT	1	89	68	30
Cyanazine	POAT	12	97	66	39
Cyanazine	SOBE	13	93	73	31
Cyanazine	SMAT	7	87	61	31
LSD 5%			7.7	12.9	6.5

Summary

Sunflower, oats, and millet control was similiar with all the oil additives with atrazine and cyanazine. However, methylated sunflower oil was or tended to be less effective in enhancing cyanazine control of certain species, including corn, than petroleum or soybean oil.

Emulsifier in oil additives with grass control herbicides, Fargo 1985. 'Moore' oats, 'Marshall' wheat, and Siberian foxtail millet were seeded as bioassay species on June 10. Treatments were applied to five leaf species on July 11. At Plus 300F (AT), T-MULZ-VO (TM), and IPEPAL CO630 (CO) emulsifiers at 5 and 15% v/v were mixed with petroleum oil 11N (PO) once-refined soybean oil (SO), and methylated sunflower oil (SM). The emulsifiable oils at 1 qt/A were mixed with the herbicides and then the water was added for application to the species. The experiment was a split plot with herbicide rates as main effect and contained three replications. Evaluations were about 2 and 4 weeks after treatment. The data presented are an average over the two evaluations. Emulsion stability was usually evaluated after the various oils with emulsifiers were mixed with the herbicides and the water for application. The emulsions were all rated good for methylated sunflower oil with all emulsifiers at 5 or 15%, with both herbicides. AT at 5% or 15% in PO gave a good emulsion with both herbicides.

(See Table of data on next page)

Summary

The data on the influence of percent various emulsifier percentages in oil additives was variable. The species control with herbicides in reponse to the various oils was most pronounced when the control was between 40 and 70%. Species control was generally higher when sethoxydim and fluazifop were applied with petroleum oil containing 15 than 5% AT emulsifier. AT emulsifier at 5 or 15% in soybean oil or methylated sunflower oil were equally as effective in enhancing species control with both fluazifop or sethoxydim. Emulsifiers CO and TM were generally equally effective at 5 or 15% of the oil additive, except for CO with petroleum oil or methylated sunflower oil used with fluazifop where 15% was more effective. The data indicates that the percent emulsifier required with an oil additive for herbicides is influenced by the emulsifier and the herbicide. The effectiveness of an oil additive with a herbicide did not usually relate to the visible emulsion stability.

Emulsifiers in oil additives

			Percent emulsifier					
			AT		CO		TM	
Herbicide	Oil	Spp	5	15	5	15	5	15
			------------(% control)------------					
Sethoxydim	PO	Wht	42	64	49	49	52	54
Sethoxydim	PO	Oat	49	68	52	54	56	62
Sethoxydim	PO	Mil	91	88	88	82	91	84
Average			61	73	63	62	66	67
Sethoxydim	SO	Wht	48	44	36	41	49	43
Sethoxydim	SO	Oat	40	45	42	43	44	38
Sethoxydim	SO	Mil	87	76	78	79	86	81
Average			58	55	52	54	60	54
Sethoxydim	SM	Wht	69	75	81	80	78	74
Sethoxydim	SM	Oat	70	81	86	89	84	86
Sethoxydim	SM	Mil	89	89	97	93	96	92
Average			79	82	88	87	86	84
Fluazifop	PO	Wht	89	91	58	82	88	88
Fluazifop	PO	Oat	74	86	19	76	70	78
Fluazifop	PO	Mil	18	26	6	13	24	19
Average			60	68	28	57	61	62
Fluazifop	SO	Wht	79	86	72	64	79	78
Fluazifop	SO	Oat	52	43	28	29	41	36
Fluazifop	SO	Mil	5	5	3	16	8	3
Average			45	45	34	36	43	39
Fluazifop	SM	Wht	90	91	88	94	90	90
Fluazifop	SM	Oat	79	84	70	85	84	77
Fluazifop	SM	Mil	24	22	12	20	22	15
Average			64	66	57	66	65	61

LSD 5% Emulxoil; Wheat=10, Oats=14, Millet=9
LSD 5% Emulxoil(average over species)=6.6 (Pooled error; wheat=82, oats=148, millet=64)

		---(Visual emulsion stability)---					
Sethoxydim	PO	G	G	P	G	P	G
Sethoxydim	SO	P	G	F	G	F	G
Sethoxydim	SM	G	G	G	G	G	G
Fluazifop	PO	G	G	F	G	F	G
Fluazifop	SO	G	G	F	G	F	G
Fluazifop	SM	G	G	G	G	G	G

P=poor, F=fair, and G=good emulsion stability

Percent emulsifier in oils with grass control herbicides, Fargo 1985. 'Moore' oats (Oat), 'Marshall' wheat (Wht), and Siberian foxtail millet (Mil) were seeded as bioassay species on June 10. Treatments were applied to six leaf species on July 12. At Plus 300F (AT) and IPEPAL CO630 (CO) emulsifier from 1 to 17% v/v were added to petroleum oil (PO) 11N and methylated sunflower (SM) oil and applied at one quart per acre as additives with sethoxydim and fluazifop at 1.5 oz/A for control of the bioassay species. At Plus 300F at these percentages was also mixed with once-refined soybean oil (SO) and emulsifier At Plus 300F (EMAT) was evaluated as an additive alone at amounts equal to that in the oil additives. Species control was evaluated 2 and 4 weeks after treatment. The experiment was a split plot with herbicides of the main effects and had three replications. The data presented was averaged over the evaluation dates.

(See Table of data on next page)

Summary

Sethoxydim control of wheat and oats generally was not enhanced more by higher than 5% AT with petroleum oil or above 15% AT with once-refined soybean oil or methylated sunflower oil. The various amounts of AT emulsifier (EMAT) did not influence sethoxydim phytotoxicity to any species. Emulsifier CO with methylated sunflower oil (SMCO) tended to be effective at a lower percentage than the AT emulsifier. Sethoxydim control of millet was high even without an additive and thus, the percent emulsifier in the oil additive had less influence on control of millet than wheat or oats. Fluazifop control of the species was not generally influenced by the percent of emulsifier in the additive, except species control tended to increase as the amount of AT applied alone was increased. Averaged over species and percent emulsifier, sethoxydim gave 71, 64, 80, 57, and 81 and fluazifop 71, 53, 70, 62, and 63% control each, respectively, with POAT, SOAT, SMAT, AT, and SMCO. Thus, the methyl esters of sunflower are with AT or CO was more effective than the other additives with sethoxydim. Petroleum oil with AT and methylated sunflower oil with CO were equally as effective additives to fluazifop and were more effective than the other additives when control was averaged over percent emulsifier, and species. The data indicates that 15% emulsifier content was required with the various oil for maximum effectiveness as additives with the herbicides for all species envolved. However, the optimum percentage emulsifier in an additive tended to vary with the oil, emulsifier, and herbicide. Emulsion stability did not generally relate to the effectiveness of the additive with a herbicide.

Percent emulsifiers in oils as additives.

Add	Spp	Sethoxydim, 1.5oz/A						Fluazifop, 1.5oz/A					
		Percent Emulsifier											
		1.0	2.5	5.0	10	15	17	1.0	2.5	5.0	10	15	17
		(Percent control)											
POAT	Wht	53	49	68	68	59	64	90	90	90	92	96	93
POAT	Oat	43	48	74	77	77	71	86	87	87	91	96	92
POAT	Mil	84	82	92	90	93	90	28	25	30	35	39	40
Average		60	60	78	78	76	75	68	67	69	73	77	75
SOAT	Wht	53	43	46	48	60	61	86	85	88	87	82	86
SOAT	Oat	56	41	52	52	66	63	56	61	68	57	55	73
SOAT	Mil	84	83	80	83	86	87	14	5	8	14	11	11
Average		64	56	59	61	71	70	52	50	55	53	49	57
SMAT	Wht	73	64	58	62	75	81	91	90	88	92	93	93
SMAT	Oat	81	73	80	79	84	85	93	92	89	94	96	95
SMAT	Mil	93	89	91	95	94	94	19	17	23	20	38	27
Average		82	75	76	79	84	86	68	66	67	69	76	72
EMAT	Wht	49	41	51	46	54	50	84	88	89	86	89	90
EMAT	Oat	48	34	42	38	56	52	71	74	82	85	85	86
EMAT	Mil	76	75	74	75	81	83	15	23	18	16	15	24
Average		58	50	56	53	64	62	57	62	63	62	63	67
SMCO	Wht	66	68	68	69	66	76	84	86	86	84	86	87
SMCO	Oat	78	82	84	85	82	85	83	85	84	87	88	92
SMCO	Mil	92	92	91	92	90	91	10	10	12	17	17	19
Average		78	81	81	82	79	84	59	60	67	64	64	66

LSD 5% TrtxOilx%emul; wheat=12, oats=12 and millet=9
LSD 5% averaged over species = 6 (pooled errors of wheat=109 oats=102, and millet=57)

	Sethoxydim 1.0	2.5	5.0	10	15	17	Fluazifop 1.0	2.5	5.0	10	15	17
	(Visual emulsion stability)											
POAT	P	F	F	G	G	G	P	F	F	G	G	G
SOAT	VP	P	P	F	F	G	VP	VP	P	F	F	F
SMAT	P	F	F	G	G	G	F	F	F	G	G	G
EMAT	G	G	G	G	G	G	G	G	G	G	G	G
SMCO	F	F	G	G	G	G	P	F	F	F	G	G

VP=very poor, P=poor, F=fair, G=good emulsion stability

Low volume oil carriers with grass control herbicides, Fargo 1985. 'Moore' oats and 'Marshall' wheat were seeded in adjacent 6 ft wide strips as bioassay species on August 2. Treatments were applied to six leaf species on September 19. Sethoxydim and fluazifop were applied in methylated soybean oil, once refined soybean oil, and petroleun oil 11N without emulsifier, at two qt/A; and in water containing methylated soybean oil with 15% AtPlus 300F, once refined soybean oil with 15% emulsifier from BASF, and petroleum oil with 17% AtPlus 300F at 1 qt/A in 8.5gpa. The oil were applied in 2 qt/A with a CDA at 2000 rpm (ca 200 u) and the oil water with 8001 flat fan nozzles. The experiment was a split plot with herbicides as the main effect and contained three replications.

			Herbicide carrier					
			SM		SO		PO	
Herbicide	Rate	Spp	Oil	O/W	Oil	O/W	Oil	O/W
	(Oz/A)		-----------(% control)-----------					
Fluazifop	0.75	Wht	88	87	82	65	93	82
Fluazifop	0.75	Oat	94	75	82	43	98	78
Fluazifop	1.50	Wht	88	89	83	83	93	82
Fluazifop	1.50	Oat	94	91	88	82	98	92
Average			91	85	84	68	95	83
Seth	1.00	Wht	88	77	72	40	75	45
Seth	1.00	Oat	90	53	72	35	75	42
Seth	2.00	Wht	88	79	77	47	81	47
Seth	2.00	Oat	95	83	83	43	85	43
Average			90	73	76	41	79	44
Haloxyfop	0.50	Wht	88	84	75	48	79	80
Haloxyfop	0.50	Oat	93	86	76	48	81	87
Haloxyfop	1.00	Wht	87	84	75	73	88	85
Haloxyfop	1.00	Oat	87	91	72	77	95	90
Average			89	86	75	61	86	86

LSD 5% HerbxOilxCarrier; wheat=19, oats=15
LSD 5% HerbxOilxCarrier=6 (averaged over species and rates)

Summary

The data were quite variable. The spray pattern with the CDA was irregular, possibly from droplet drift. Control values were an estimated average considering the intended plot width. The data indicated that these herbicides applied directly in oils without emulsifiers were equally or more effective than when applied in water containing the oil with emulsifiers. The methylated seed oil was similar to petroleun oil as additives or carriers for fluazifop and haloxyfop, but more effective than petroleum when with sethoxydim.

Three species evaluation of the effect of volume on grass herbicides, Fargo (NW section 22), 1985. Siberian foxtail millet, Moore oats, and Marshall wheat were seeded across herbicide plots in 6 foot strips June 10. Treatments were applied in 8.5 or 25 gpa water at 40psi to an 80 inch strip through the center of each plot and across the three grass species 9:00 am July 22 when the air temp. was 81F, soil temp. at six inches was 67F, rel. hum. was 33%, and the wind was southeast at 8-10 mph. Wheat was 15 inches tall, foxtail millet was 17 inches tall, and oats was 23 inches tall and beginning to head on July 22. The 8.5 gpa volume was accomplished with 8001 nozzles and 8003 nozzles were used to apply the 25 gpa treatments. Wheat, oats, and foxtail millet control was evaluated July 30 and August 21. The two evaluations were averaged and reported here. The average grass control rating is the mean of the three control ratings for each treatment.

Treatment* (a.i./A) Rate (gpa) Volume	Wheat control rating	Oats control rating	Foxtail Millet control rating	Average Grass control rating
	(%)			
Sethoxydim (1.5 oz) 8.5 gpa	72	83	92	82
Sethoxydim (1.5 oz) 25 gpa	46	47	72	55
Fluazifop (1.25 oz) 8.5 gpa	68	64	42	58
Fluazifop (1.25 oz) 25 gpa	64	62	50	58
Haloxyfop (.5 oz) 8.5 gpa	59	64	65	63
Haloxyfop (.5 oz) 25 gpa	55	56	61	57
DPX-Y6202 (.5 oz) 8.5 gpa	60	23	62	48
DPX-Y6202 (.5 oz) 25 gpa	59	23	63	48
Clopropoxydim (1 oz) 8.5 gpa	54	68	68	63
Clopropoxydim (1 oz) 25 gpa	48	64	62	58
Fenoxaprop (1 oz) 8.5 gpa	8	35	70	38
Fenoxaprop (1 oz) 25 gpa	7	27	70	34
SC-1084 (2 oz) 8.5 gpa	64	63	38	55
SC-1084 (2 oz) 25 gpa	60	59	40	53
BAS-51702 (.75 oz) 8.5 gpa	67	71	78	72
BAS-51702 (.75 oz) 25 gpa	59	68	75	67
Sethoxy+Desmed (1.5+16 oz) 8.5 gpa	65	39	71	59
Sethoxy+Desmed (1.5+16 oz) 25 gpa	67	37	70	57
Fluazifop+Desm (1.5+16 oz) 8.5 gpa	79	63	30	57
Fluazifop+Desm (1.5+16 oz) 25 gpa	81	65	50	65
Haloxyfop+Desm (.5+16 oz) 8.5 gpa	62	46	32	46
Haloxyfop+Desm (.5+16 oz) 25 gpa	49	46	30	41
DPX-Y6202+Desm (.5+16 oz) 8.5 gpa	48	31	30	36
DPX-Y6202+Desm (.5+16 oz) 25 gpa	60	21	24	35
Clopropoxy+Desm (1+16 oz) 8.5 gpa	68	66	68	67
Clopropoxy+Desm (1+16 oz) 25 gpa	65	50	57	58
Fenoxaprop+Desm (1+16 oz) 8.5 gpa	34	24	38	32
Fenoxaprop+Desm (1+16 oz) 25 gpa	42	28	49	39
SC-1084+Desmed (2+16 oz) 8.5 gpa	78	48	23	49
SC-1084+Desmed (2+16 oz) 25 gpa	79	53	21	51
BAS-51702+Desm (.75+16 oz) 8.5 gpa	52	65	72	63
BAS-51702+Desm (.75+16 oz) 25 gpa	59	59	59	59

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Treatment* (a.i./A)	Rate	Volume (gpa)	Wheat control rating	Oats control rating	Foxtail Millet control rating	Average Grass control rating
			----------	----------	(%)	----------
Sethoxy+Bentazon	(1.5+12 oz)	8.5 gpa	13	4	42	19
Sethoxy+Bentazon	(1.5+12 oz)	25 gpa	1	5	52	20
Fluaz+Bentazon	(1.25+12 oz)	8.5 gpa	65	65	41	57
Fluaz+Bentazon	(1.25+12 oz)	25 gpa	63	61	41	55
Haloxy+Bentazon	(.5+12 oz)	8.5 gpa	45	41	37	41
Haloxy+Bentazon	(.5+12 oz)	25 gpa	39	34	30	34
DPX-Y6202+Benta	(.5+12 oz)	8.5 gpa	59	54	48	54
DPX-Y6202+Benta	(.5+12 oz)	25 gpa	56	22	46	41
Clopropoxy+Benta	(1+12 oz)	8.5 gpa	29	15	27	24
Clopropoxy+Benta	(1+12 oz)	25 gpa	9	17	24	17
Fenoxaprop+Benta	(1+12 oz)	8.5 gpa	8	18	55	27
Fenoxaprop+Benta	(1+12 oz)	25 gpa	5	6	60	24
SC-1084+Bentazon	(2+12 oz)	8.5 gpa	61	58	16	45
SC-1084+Bentazon	(2+12 oz)	25 gpa	65	44	15	41
BAS-51702+Bentazon	(.75+12 oz)	8.5 gpa	12	10	17	13
BAS-51702+Bentazon	(.75+12 oz)	25 gpa	3	6	22	10
Mean			49	43	48	47
High mean			81	83	92	82
Low mean			1	4	15	10
Coeff. of variation			13	22	20	14
LSD(1 Percent)			11	17	17	12
LSD(5 Percent)			9	13	13	9
No. of reps			4	4	4	4

* All grass herbicides were combined with 1 qt./A Hopkin's Agicide Activator

Summary

Sethoxydim gave less grass control at 25 gpa than at 8.5 gpa when used alone. All other grass herbicides gave similar control at 8.5 or 25 gpa. Spray volume had no effect on antagonism.

Three species evaluation of herbicide antagonism using two spray booms and two volumes of water, Fargo (NW section 22), 1985. Siberian foxtail millet, Moore oats, and Marshall wheat were seeded in six foot strips across herbicide plots June 10. Treatments were applied in 6 or 25 gpa water at 40 psi to an 80 inch strip across the 3 grass species 10:30 am July 26 when the air temp. was 82 F, wind was north at 5 mph, and the sky was sunny and clear. Wheat, oats and foxtail millet were all in the late boot stage July 26. Six gpa volume was accomplished with 800067 nozzle tips and 8003 tips were used for the 25 gpa volume. The " / " symbol indicates two separted booms applying the treatment, one following immediately behind the other in the order listed. Control of the three grass species was evaluated August 15 and August 23. These two evaluations were averaged together and reported here. The average grass control rating is the mean of the 3 control ratings for each treatment.

Treatment* Rate (a.i./A) Volume (gpa)	Wheat control rating	Oats control rating	Foxtail Millet control rating	Average Grass control rating
	(%)			
Sethoxydim (1.5 oz) 6 gpa	25	26	74	42
Sethoxydim (1.5 oz) 25 gpa	18	11	68	32
Fluazifop (1.25 oz) 6 gpa	36	36	52	41
Fluazifop (1.25 oz) 25 gpa	32	31	53	39
DPX-Y6202 (.5 oz) 6 gpa	23	7	19	16
DPX-Y6202 (.5 oz) 25 gpa	17	4	28	16
Haloxyfop (.5 oz) 6 gpa	23	26	44	31
Haloxyfop (.5 oz) 25 gpa	15	19	46	27
Sethoxy+Desmedipham (1.5+16oz) 6 gpa	16	5	54	25
Sethoxy+Desmed (1.5+16oz) 25 gpa	11	5	56	24
Seth (1.5oz) 6 gpa/Des (16oz) 6 gpa	28	28	66	41
Seth (1.5oz) 25 gpa/Des (16oz) 25 gpa	22	5	71	33
Seth (1.5oz) 6 gpa/Des (16oz) 25 gpa	28	27	68	41
Sethoxy+Bentazon (1.5+12oz) 6 gpa	5	3	26	11
Sethoxy+Bentazon (1.5+12oz) 25 gpa	0	1	19	7
Seth (1.5oz) 6 gpa/Bent (12oz) 6 gpa	23	33	71	42
Seth(1.5oz) 25 gpa/Bent(12oz) 25 gpa	6	1	66	24
Seth(1.5oz) 6 gpa/Bent(12oz) 25 gpa	20	19	65	35
Fluazifop+Desmed (1.25+16oz) 6 gpa	29	20	16	22
Fluaz+Desmed (1.25+16oz) 25 gpa	24	6	1	11
Flua(1.25oz) 6 gpa/Des(16oz) 6 gpa	34	31	33	32
Flua(1.25oz) 25 gpa/Des(16oz) 25 gpa	33	23	31	29
Flua(1.25oz) 6 gpa/Des(16oz) 25 gpa	30	26	29	28
Fluaz+Bentazon (1.25+12oz) 6 gpa	27	25	14	22
Fluaz+Bentazon (1.25+12oz) 25 gpa	24	17	28	23
Flua(1.25oz) 6 gpa/Bent(12oz) 6 gpa	29	27	27	27
Flua(1.25oz) 25 gpa/Bent(12oz) 25 gpa	32	16	26	24
Flua(1.25oz) 6 gpa/Bent(12oz) 25 gpa	34	40	44	39
DPX-Y6202+Desmed (.5+16oz) 6 gpa	11	2	5	6
DPX-Y6202+Desmed (.5+16oz) 25 gpa	8	2	2	4
DPX-Y(.5oz) 6 gpa/Des (16oz) 6 gpa	23	7	8	13
DPX-Y(.5oz) 25 gpa/Des(16oz) 25 gpa	13	5	10	9
DPX-Y(.5oz) 6 gpa/Des(16oz) 25 gpa	21	16	19	19
DPX-Y6202+Bentazon (.5+12oz) 6 gpa	22	16	7	15
DPX-Y6202+Bentazon (.5+12oz) 25 gpa	8	1	0	3
DPX-Y(.5oz) 6 gpa/Bent(12oz) 6 gpa	30	13	26	23
DPX-Y(.5oz) 25 gpa/Bent(12oz) 25 gpa	16	2	6	8
DPX-Y(.5oz) 6 gpa/Bent(12oz) 25 gpa	18	9	12	13

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Treatment*	Rate (a.i./A)	Volume (gpa)	Wheat control rating	Oats control rating	Foxtail Millet control rating	Average Grass control rating
			----------------	----------------	(%) ----------------	----------------
Haloxyfop+Desmed	(.5+16oz)	6 gpa	6	8	3	6
Haloxyfop+Desmed	(.5+16oz)	25 gpa	11	10	5	8
Halox(.5oz) 6 gpa/Des(16oz) 6 gpa			22	27	23	24
Halox(.5oz) 25 gpa/Des(16oz) 25 gpa			11	6	13	10
Halox(.5oz) 6 gpa/Des(16oz) 25 gpa			13	12	15	13
Haloxy+Bentazon	(.5+12oz)	6 gpa	12	11	5	9
Haloxy+Bentazon	(.5+12oz)	25 gpa	13	9	5	9
Halox(.5oz) 6 gpa/Bent(12oz) 6 gpa			22	32	24	26
Halox(.5oz) 25 gpa/Bent(12oz) 25 gpa			11	8	17	12
Halox(.5oz) 6 gpa/Bent(12oz) 25 gpa			21	27	34	27
Mean			20	15	30	22
High mean			36	40	74	42
Low mean			0	1	0	3
Coeff. of variation			30	51	31	26
LSD(1 Percent)			11	14	17	10
LSD(5 Percent)			8	11	13	8
No. of reps			4	4	4	4

* All grass herbicides were combined with 1 qt./A Hopkin's Agicide Activator

Summary

Sethoxydim gave less grass control when applied at 25 gpa than at 6 gpa. Volume did not influence grass control from DPX-Y6202, haloxyfop, or fluazifop. Sethoxydim+desmedipham and sethoxydim+bentazon, tank mixed, gave less grass control than sethoxydim alone. Applying sethoxydim separately from desmedipham eliminated the antagonism. No antagonism was observed when sethoxydim was applied in 6 gpa and bentazon was applied in 6 or 25 gpa. Fluazifop plus desmedipham gave less grass control than fluazifop alone regardless of application method. Fluazifop in 6 gpa followed by bentazon in 25 gpa gave grass control similar to fluazifop alone but all other combinations gave less grass control. The level of grass control from DPX-Y6202 alone was too low for the data to be meaningful. Haloxyfop+desmedipham and haloxyfop+bentazon gave less grass control than haloxyfop alone except where haloxyfop was applied in 6 gpa and desmedipham or bentazon were applied in 6 gpa, and where haloxyfop was applied in 6 gpa and bentazon was applied in 25 gpa.

Three species evaluation of the timing effect on herbicide antagonism, Fargo (NW section 22), 1985. Siberian foxtail millet, Marshall wheat, and Moore oats were planted in six foot strips across herbicide plots June 10. All herbicides were applied in an 80 inch strip across the three grass species in 17 gpa water at 40 psi. Day one of the experiment was July 8 when wheat was 5-6 inches tall, oats was 7-9 inches tall, and foxtail millet was 4-6 inches tall. Soil July 8-12 was dry on the surface, moist at 1-2 inches, and wet at 3-4 inches. No measureable precipitation occurred during the week of July 8. Other weather data during spraying is as follows:

Date	Day	Air Temp. (deg. F)	Soil Temp. at six inches (deg. F)	Wind Direction	Wind Speed (mph)	Relative Humidity (%)	Time of Day
July 8	(D1)	88	71	north	3-4	38	2:00 pm
July 9	(D2)	75	71	north	12	66	9:00 am
July 10	(D3)	70	67	north	3-4	56	5:00 am
July 11	(D4)	70	65	north	2	52	8:30 am
July 12	(D5)	71	68	east	3	60	7:45 am

Wheat, oats, and foxtail millet control were evaluated July 29 and August 21. The mean percent control from these two evaluations is reported here. The average grass control rating is the mean of the three control ratings for each treatment.

Treatment*	Day of Application	Rate (lb/A)	Wheat control rating (%)	Oats control rating (%)	Foxtail Millet control rating (%)	Average Grass control rating (%)
Sethoxydim+OC	D3	.1+.25G	66	81	95	81
Sethoxydim+OC	D3	.2+.25G	93	95	99	95
Fluazifop+OC	D3	.062+.25G	92	87	23	67
Fluazifop+OC	D3	.125+.25G	96	99	60	85
DPX-Y6202+OC	D3	.05+.25G	98	88	96	94
DPX-Y6202+OC	D3	.1+.25G	99	98	99	99
Haloxyfop+OC	D3	.05+.25G	95	97	73	88
Haloxyfop+OC	D3	.1+.25G	99	99	98	99
Desmedipham+Seth+OC	D3	.75+.1+.25G	62	39	59	53
Desmedipham+Seth+OC	D3	.75+.2+.25G	74	57	93	75
Desmedipham+Flua+OC	D3	.75+.062+.25G	91	51	14	52
Desmedipham+Flua+OC	D3	.75+.125+.25G	96	86	25	69
Desmedipham+DPX-Y6+OC	D3	.75+.05+.25G	83	21	21	41
Desmedipham+DPX-Y6+OC	D3	.75+.1+.25G	98	57	94	83
Desmedipham+Haloxy+OC	D3	.75+.05+.25G	69	57	30	52
Desmedipham+Haloxy+OC	D3	.75+.1+.25G	97	97	58	84
Bentazon+Seth+OC	D3	1+.1+.25G	8	14	46	22
Bentazon+Seth+OC	D3	1+.2+.25G	50	42	71	54
Bentazon+Flua+OC	D3	1+.062+.25G	86	69	13	56
Bentazon+Flua+OC	D3	1+.125+.25G	97	99	37	77
Bentazon+DPX-Y6+OC	D3	1+.05+.25G	99	89	76	88
Bentazon+DPX-Y6+OC	D3	1+.1+.25G	99	98	99	99
Bentazon+Haloxy+OC	D3	1+.05+.25G	93	96	47	78
Bentazon+Haloxy+OC	D3	1+.1+.25G	99	99	86	94

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Treatment*	Day of Application	Rate (lb/A)	Wheat control rating	Oats control rating	Foxtail Millet control rating	Average Grass control rating
			-------	-------	(%) -------	-------
Seth+OC D3/Desm D5		.1+.25G/.75	81	74	99	85
Seth+OC D3/Desm D5		.2+.25G/.75	96	95	99	96
Flua+OC D3/Desm D5		.062+.25G/.75	91	84	39	71
Flua+OC D3/Desm D5		.125+.25G/.75	97	98	73	89
DPX-Y6+OC D3/Desm D5		.05+.25G/.75	97	87	98	94
DPX-Y6+OC D3/Desm D5		.1+.25G/.75	99	94	99	97
Haloxy+OC D3/Desm D5		.05+.25G/.75	93	98	86	92
Haloxy+OC D3/Desm D5		.1+.25G/.75	98	99	98	98
Seth+OC D3/Bent D5		.1+.25G/1	56	55	94	68
Seth+OC D3/Bent D5		.2+.25G/1	92	94	99	95
Flua+OC D3/Bent D5		.062+.25G/1	91	90	41	74
Flua+OC D3/Bent D5		.125+.25G/1	96	98	69	88
DPX-Y6+OC D3/Bent D5		.05+.25G/1	97	89	96	94
DPX-Y6+OC D3/Bent D5		.1+.25G/1	99	96	98	97
Haloxy+OC D3/Bent D5		.05+.25G/1	93	97	79	90
Haloxy+OC D3/Bent D5		.1+.25G/1	98	99	95	98
Seth+OC D3/Desm D4		.1+.25G/.75	82	71	97	83
Seth+OC D3/Desm D4		.2+.25G/.75	89	93	99	93
Flua+OC D3/Desm D4		.062+.25G/.75	96	86	66	82
Flua+OC D3/Desm D4		.125+.25G/.75	96	98	81	91
DPX-Y6+OC D3/Desm D4		.05+.25G/.75	99	84	99	94
DPX-Y6+OC D3/Desm D4		.1+.25G/.75	99	94	99	97
Haloxy+OC D3/Desm D4		.05+.25G/.75	95	97	91	94
Haloxy+OC D3/Desm D4		.1+.25G/.75	97	99	98	98
Seth+OC D3/Bent D4		.1+.25G/1	73	73	96	80
Seth+OC D3/Bent D4		.2+.25G/1	89	94	99	94
Flua+OC D3/Bent D4		.062+.25G/1	93	87	40	74
Flua+OC D3/Bent D4		.125+.25G/1	96	98	65	86
DPX-Y6+OC D3/Bent D4		.05+.25G/1	99	91	98	96
DPX-Y6+OC D3/Bent D4		.1+.25G/1	99	97	99	98
Haloxy+OC D3/Bent D4		.05+.25G/1	94	97	78	90
Haloxy+OC D3/Bent D4		.1+.25G/1	99	99	96	98
Desm D2/Seth+OC D3		.75/.1+.25G	65	47	68	60
Desm D2/Seth+OC D3		.75/.2+.25G	81	59	86	75
Desm D2/Flua+OC D3		.75/.062+.25G	95	62	24	60
Desm D2/Flua+OC D3		.75/.125+.25G	97	91	25	71
Desm D2/DPX-Y6+OC		.75/.05+.25G	99	46	66	71
Desm D2/DPX-Y6+OC		.75/.1+.25G	99	65	75	80
Desm D2/Haloxy+OC D3		.75/.05+.25G	92	79	50	73
Desm D2/Haloxy+OC D3		.75/.1+.25G	99	97	59	85

Table continued on next page.

Table continued from last page.

Treatment* Day of Application	Rate (lb/A)	Wheat control rating	Oats control rating	Foxtail Millet control rating	Average Grass control rating
		----------	---------- (%)	----------	----------
Bent D2/Seth+OC D3	1/.1+.25G	41	44	86	57
Bent D2/Seth+OC D3	1/.2+.25G	90	90	99	93
Bent D2/Flua+OC D3	1/.062+.25G	92	89	13	64
Bent D2/Flua+OC D3	1/.125+.25G	95	98	16	69
Bent D2/DPX-Y6+OC D3	1/.05+.25G	96	85	77	86
Bent D2/DPX-Y6+OC D3	1/.1+.25G	99	97	97	98
Bent D2/Haloxy+OC D3	1/.05+.25G	94	97	33	75
Bent D2/Haloxy+OC D3	1/.1+.25G	99	99	76	91
Desm D1/Seth+OC D3	.75/.1+.25G	48	40	69	52
Desm D1/Seth+OC D3	.75/.2+.25G	81	60	96	79
Desm D1/Flua+OC D3	.75/.062+.25G	96	59	26	60
Desm D1/Flua+OC D3	.75/.125+.25G	99	93	43	78
Desm D1/DPX-Y6+OC D3	.75/.05+.25G	99	41	60	66
Desm D1/DPX-Y6+OC D3	.75/.1+.25G	99	81	94	91
Desm D1/Haloxy+OC D3	.75/.05+.25G	96	93	61	83
Desm D1/Haloxy+OC D3	.75/.1+.25G	98	97	83	92
Bent D1/Seth+OC D3	1/.1+.25G	71	78	96	81
Bent D1/Seth+OC D3	1/.2+.25G	93	97	99	96
Bent D1/Flua+OC D3	1/.062+.25G	97	92	69	86
Bent D1/Flua+OC D3	1/.125+.25G	99	99	77	91
Bent D1/DPX-Y6+OC D3	1/.05+.25G	98	88	96	94
Bent D1/DPX-Y6+OC D3	1/.1+.25G	99	96	99	98
Bent D1/Haloxy+OC D3	1/.05+.25G	97	98	85	93
Bent D1/Haloxy+OC D3	1/.1+.25G	99	99	95	98
Mean		90	83	74	82
High mean		99	99	99	99
Low mean		8	14	13	22
Coeff. of variation		4	7	9	5
LSD(1 Percent)		8	11	15	8
LSD(5 Percent)		6	9	11	6
No. of reps		3	3	3	3

* OC = Hopkin's Agicide Activator

Summary

Grass control was generally less when desmedipham or bentazon was combined with a grass herbicide than when the grass herbicide was applied alone except bentazon did not antagonize DPX-Y6202 at 0.1 lb/A, and haloxyfop and DPX-Y6202 at 0.05 lb/A were only antagonized for foxtail millet control. Applying desmedipham or bentazon one or two days after the grass herbicides generally eliminated antagonism. Applying desmedipham one or two days prior to the grass herbicides did not eliminate the antagonism. Applying bentazon one day prior to the grass herbicide did not always eliminated antagonism but application two days prior to the grass herbicides eliminated antagonism.