PROJECT TITLE: Combination Herbicide Study

YEAR/PROJECT: 1990/754

INVESTIGATORS: Leader - Vern R. Stewart, Todd Keener, Research Specialist

OBJECTIVE: To determine the effectiveness of broadleaf and wild oat herbicide treatments in combination for broad spectrum weed control.

RESULTS:

Newana spring wheat strips were planted April 19, 1990 using a International press-type drill with 7 inch spacing. Seed depth was 1 1/2 inches in a seedbed that had been first fall plowed, spring disced, cultivated and then packed. Herbicide plots were established perpendicular to the 12 foot grain strips. Herbicides were applied at the three leaf stage of wild oats using a research-type, tractor mounted sprayer. Plots were 10 feet by 12 feet with treatments being replicated four times in a randomized complete block design. A volume of 27.57 gpa was applied using 8002 nozzles at 32 PSI. Previous crop was spring barley. A surfactant was used at .25% v/v for imazamethabenz, fenoxaprop and DPX-R9674 while 1 pt/A was used with diclfop. A Hege plot combine was used for harvest.

Application data.

Date date:	May 22, 1990	Air temp:	50 F
Soil temp:	53 F	Wind:	0-1 mph
Soil moisture:	Top-good	Subsoil-v.good	
Rel. Humidity:	41%	Clouds:	Hazy

Crop stage: 4-5 leaf, tillering

Weed stage: Henbit (Lamium amplx.) - 2 leaves
Chickweed (Stellaria media)- 4-6 leaves
Campion (Silene latifolia)- 4 leaves
Wild oats (Avena fatua) 3 leaf

A good broadleaf and wild oat population in the test area and little disease pressure resulted in a excellent evaluation of tank mix herbicides. Stand reduction was slight in a few treatments where 2,4-D and MCPA were combined with bromoxynil or DPX-R9674. Table 1.

All combination treatments that included one of the three wild oat herbicides tested had yields significantly higher than the check. The four treatments that were equal to, or less than the check in yield were the broadleaf treatments alone. The high yield was harvested from a plot treated with bromoxynil and diclfop (92.7 bu/A). The check plot yield was 40.01 bu/A. Although yield reductions were mainly a result of wild oat competition rather than herbicide injury slight yield reductions were observed where phenoxy herbicides were tank mixed with formulated phenoxy herbicides (Tiller herbicide contains both 2,4-D and MCPA).

All three wild oat herbicides gave good to excellent wild oat control but were antagonistically effected in some tank mixes. Imazamethabenz combined with bromoxynil and/or MCPA had decreased wild oat control compared to when applied alone. Diclfop wild oat control was decreased when tank mixed with bromoxynil, 2,4-D, or with both. Fenoxaprop was the most consistent in wild oat control when tank mixed

with only slight antagonism recorded with mixtures of 2,4-D.

The four broadleaf herbicides applied alone resulted in test weights of grain that were equal to or less than the check. All other test weights were significantly higher than the check. Lodging was also severe in the plots treated only with broadleaf herbicides and not present in other treatments.

Broadleaf weed control was not greatly enhanced or antagonized by most tank mixes except where DPX-R9674 or additional phenoxy herbicides were added to the pre-package blend of fenoxaprop + 2,4-D + MCPA (Tiller herbicide).

SUMMARY:

Additional phenoxies added to formulated phenoxy herbicide treatments did cause slight decreases in yields. The addition of DPX-R9674 to diclofop, imazamethaenz, and fenoxaprop did not significantly change yield, test weight, and weed control when evaluated on Newana spring wheat. Addition of the butoxyethyl ester of 2,4-D (Weedon LV4) to fenoxaprop decreased yields and wild oat control yet gave better broadleaf weed control than the iosocty ester of 2,4-D in the formulation of fenoxaprop + MCPA + 2,4-D.

FUTURE PLANS:

The combination herbicide evaluations have been an active part of weed investigations in Kalispell but most may be absorbed into an economical weed management, maximum economic yield program next year.

Table 1. Crop injury and weed control data from the Combination Herbicide Study. NWARC, Kalispell, MT. R13

Treatment	Form.	Rate	% Std Reduction	Percent Weed Control 6/22/90 1/ CKWD	MNBT	COCKL	WOAT	% Wild Oat Control 7/3	7/13
Imazamethabenz. + .25% v/v surf	2.5 EC	.38 #	.0000	10.00	17.50	45.00	98.00	92.75	98.00
Diclofop + surf 1 pt/A	3.0 EC	.75 #	.2500	21.25	20.00	.0000	93.00	89.25	90.25
Fenoxaprop + S	.58 EC	.074 #	.8821	32.42	33.29	23.23	99.56	94.12	99.08
Fenoxaprop+MCPA+ 2,4-D	3.08 EC	.66 #	.2500	35.00	40.00	25.00	93.50	95.75	97.00
Bromoxynil	4.0 EC	.25 #	.0000	58.75	69.75	75.00	23.75	.0000	.0000
Bromoxynil + MCPA	4.0 EC 3.8 EC	.25 # .25 #	.0000	31.25	37.50	50.00	.0000	.0000	.0000
DPX-R9674 +.25% Surf	75 DF	.014#	.0000	92.75	88.50	70.00	.0000	5.000	.0000
2,4-D	3.8 EC	.5 #	.0000	43.75	62.50	52.50	.0000	.0000	.0000
Bromoxynil +diclofop + surf	4.0 EC 3.0 EC	.25 # .75 #	.0000	.0000	.0000	.0000	94.50	99.00	94.00
Bromoxynil + MCPA +diclofop + surf	4.0 EC 3.8 EC 3.0 EC	.25 # .06 # .75 #	1.250	49.50	47.00	49.75	97.50	87.75	73.75
DPX-R9674 +.25% S +diclfop + surf	75 DF 3.0 EC	.014# .75 #	.0000	87.50	88.75	98.75	91.25	93.00	86.50
2,4-D +diclfop + surf	3.8 EC 3.0 EC	.5 # .75 #	.0000	17.50	22.50	25.00	68.75	40.00	32.50
Bromoxynil + Imaza.+.25% S	4.0 EC 2.5 EC	.25 # .38 #	2.000	73.75	79.75	85.00	94.75	88.00	82.00
Bromoxynil + MCPA + Imaza.+.25% S	4.0 EC 3.8 EC 2.5 EC	.25 # .25 # .38 #	1.250	49.75	56.25	37.50	92.75	93.25	87.00
DPX-R9674 +.25% S + Imaza.+.25% S	75 DF 2.5 EC	.014# .38 #	.5000	97.50	93.75	100.0	97.50	99.25	97.00
2,4-D + Imaza.+.25% S	3.8 EC 2.5 EC	.5 # .38 #	1.000	52.50	75.00	70.00	98.00	98.75	96.50
Bromoxynil + Fenoxa + S	4.0 EC .58 EC	.25 # .074 #	.7500	25.00	25.00	35.00	97.25	96.50	96.00

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Table 1 (Cont'd). Crop injury and weed control data from the Combination Herbicide Study. NWARC.

Treatment	Form.	Rate	% Std Reduction	--- Percent Weed Control 6/22/90 --- CKWD	HNBT	COCKL	WOAT	% Wild Oat Control 7/3	7/13
Bromoxynil + MCPA + Fenoxa + S	4.0 EC 3.8 EC .58 EC	.25 # .25 # .074 #	1.500	56.25	46.00	50.00	95.25	97.50	97.50
DPX-R9674 +.25% S + Fenoxa + S	75 DF .58 EC	.014# .074 #	1.250	92.50	93.25	87.50	97.00	96.25	94.50
2,4-D + Fenoxa + S	3.8 EC .58 EC	.5 # .074 #	2.500	42.50	65.00	52.50	89.00	94.00	88.50
Bromoxynil + Fenoxa+MCPA+ 2,4-D	4.0 EC 3.08 EC	.25 # .66 #	1.250	42.50	55.00	62.00	99.50	94.50	96.50
Bromoxynil + MCPA + Fenoxa+MCPA+ 2,4-D	4.0 EC 3.8 EC 3.08 EC	.25 # .25 # .66 #	3.000	90.00	85.25	80.00	99.00	96.75	94.75
DPX-R9674 +.25% S + Fenoxa+MCPA+ 2,4-D	75 DF 3.08 EC	.014# .66 #	2.250	99.50	97.75	100.0	98.75	92.75	90.00
2,4-D + Fenoxa+MCPA+ 2,4-D	3.8 EC 3.08 EC	.5 # .66 #	1.500	46.00	57.75	47.50	71.75	85.00	80.75
Check	----	----	.0000	.0000	.0000	.0000	.0000	.0000	.0000
OVERALL MEAN =			.8586	50.25	54.65	53.35	75.38	72.95	73.65
F-RATIO TRTS =			2.067	3.683	3.235	2.674	17.52	67.05	6.892
P-VALUE TRTS =			.0091	.0000	.0001	.0006	.0000	.0000	.0000
CV (SE/MEAN) =			73.28	31.70	30.32	34.99	11.72	6.420	22.41
LSD(0.05 by t)=			1.767	44.60	46.40	52.14	25.00	13.25	46.77

1/ Weed headings:
CKWD = chickweed (Stellaria media)
HNBT = henbit (Lamium amplexicauli)
COCKL = white cockle (Lychnis alba)
WOAT = wild oat (Avena fatua)

Table 2. Agronomic data from the Combination Herbicide Study. NWARC, Kalispell, MT in 1990

Treatment	Form	Rate lb ai/A	Yield Bu/A	Test Wt lb/Bu	Height Inches	Lodging 1/ %	Lodging 1/ Angle
Imazamethabenz + .25% surf	2.5 EC	.38 #	84.64	59.97	35.04	.0000	.0000
Diclofop + surf (1 pt/A)	3.0 EC	.75 #	72.91	59.88	34.84	.0000	.0000
Fenoxaprop + S	.58 EC	.074 #	76.58	59.97	34.84	.0000	.0000
Fenoxaprop+MCPA+ 2,4-D	3.08 EC	.66 #	80.55	60.00	34.35	.0000	.0000
Bromoxynil	4.0 EC	.25 #	43.64	57.40	35.43	52.50	5.000
Bromoxynil + MCPA	4.0 EC 3.8 EC	.25 # .25 #	27.61	51.60	34.55	83.75	7.750
DPX-R9674 +.25% S	75 DF	.014#	50.14	56.10	35.04	46.25	4.250
2,4-D	3.8 EC	.5 #	36.89	55.40	34.45	23.75	4.500
Bromoxynil +diclofop + surf	4.0 EC 3.0 EC	.25 # .75 #	92.66	60.25	35.43	.0000	.0000
Bromoxynil + MCPA +diclofop + surf	4.0 EC 3.8 EC 3.0 EC	.25 # .06 # .75 #	68.95	59.08	34.35	.0000	.0000
DPX-R9674 +.25% S +diclofop + surf	75 DF 3.0 EC	.014# .75 #	82.27	59.92	34.65	.0000	.0000
2,4-D +diclfop + surf	3.8 EC 3.0 EC	.5 # .75 #	62.35	57.95	34.84	.0000	.0000
Bromoxynil + Imaza. + .25% S	4.0 EC 2.5 EC	.25 # .38 #	70.55	59.28	34.55	.0000	.0000
Bromoxynil + MCPA + Imaza.+.25% S	4.0 EC 3.8 EC 2.5 EC	.25 # .25 # .38 #	76.53	59.08	35.04	.0000	.0000
DPX-R9674 +.25% S + Imaza.+.25% S	75 DF 2.5 EC	.014# .38 #	74.38	59.85	34.35	.0000	.0000
2,4-D + Imaza.+.25% S	3.8 EC 2.5 EC	.5 # .38 #	66.69	58.57	32.97	.0000	.0000
Bromoxynil + Fenoxa + S	4.0 EC .58 EC	.25 # .074 #	82.69	59.80	34.94	.0000	.0000

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Table 2 (Cont'd). Agronomic data from the Combination Herbicide Study. NWARC, Kalispell.

Treatment	Form	Rate lb ai/A	Yield Bu/A	Test Wt lb/Bu	Height Inches	Lodging %	Lodging Angle
Bromoxynil + MCPA + Fenoxa + S	4.0 EC 3.8 EC .58 EC	.25 # .25 # .074 #	81.66	60.00	34.74	.0000	.0000
DPX-R9674 +.25% S + Fenoxa + S	75 DF .58 EC	.014# .074 #	73.28	59.85	34.74	.0000	.0000
2,4-D + Fenoxa + S	3.8 EC .58 EC	.5 # .074 #	64.09	59.00	33.86	.0000	.0000
Bromoxynil + Fenoxa+MCPA+ 2,4-D	4.0 EC 3.08 EC	.25 # .66 #	83.04	59.88	34.45	.0000	.0000
Bromoxynil + MCPA + Fenoxa+MCPA+ 2,4-D	4.0 EC 3.8 EC 3.08 EC	.25 # .25 # .66 #	69.86	59.62	34.15	.0000	.0000
DPX-R9674 +.25% S + Fenoxa+MCPA+ 2,4-D	75 DF 3.08 EC	.014# .66 #	73.12	59.88	33.56	.0000	.0000
2,4-D + Fenox + MCPA +2,4-D	3.8 EC	.5 #	63.03	58.67	33.66	.0000	.0000
Check	----	----	40.01	55.72	35.14	56.25	6.250
OVERALL MEAN =			67.93	58.67	34.56	10.50	1.110
F-RATIO TRTS =			8.388	14.69	1.355	10.59	11.10
P-VALUE TRTS =			.0000	.0000	.1601	.0000	.0000
CV (SE/MEAN) =			8.378	.9044	1.448	67.82	63.32
LSD(0.05 by t)=			16.04	1.496	1.411	20.07	1.981

1/ Lodging notes: % = percent of plot lodged
angle = degree of lodging, 0 = none, 9 = lodged to ground