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HERBICIDAL CONTROL OF JOINTED GOATGRASS, DOWNY BROME, HORSEWEED, AND PRICKLY LETTUCE

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SUMMARY

In the Panhandle area, most effective and consistent control of jointed goatgrass, downy brome, horseweed, and prickly lettuce growing on roadsides or fallow fields was obtained with herbicides when weeds were 4 inches tall or less and growing with adequate soil water to promote vigorous growth. However, acceptable control of vigorous larger weeds sometimes was obtained. The best herbicides for jointed goatgrass were Roundup, Landmaster BW, and Fusilade 2000. Downy brome was controlled with Roundup, Landmaster BW, Assure, and Fusilade 2000. Acceptable herbicides for horseweed were 2,4-D ester, Banvel, AAtrex + 2,4-D, Glean, Amber, Ally, Ally + 2,4-D, and Harmony. Prickly lettuce control was obtained with 2,4-D ester, AAtrex + 2,4-D, and Ally + 2,4-D.

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INTRODUCTION

Jointed Goatgrass (Agilops cylindrica Host) and Downy brome (Bromus tectorum L.) have the potential of becoming serious weeds in both dryland and irrigated winter wheat in the southern Great Plains. Horseweed sometimes called marestail [Conyza canadensis (L.) Cronq.] and prickly lettuce (Lactuca serriola L.) are winter annual weeds that are hard to kill in no-tillage cropping systems.

The purpose of this progress report is to summarize several years of research with herbicides for controlling the above weeds growing in fallow fields and roadsides. Previous research using several herbicides and in some instances various amounts of spray carrier has been summarized in (Wiese and Chenault, 1987 and Wiese, Chenault, and Wood, 1987). Weeds studied in the two publications were: Pigweed (Amaranthus palmeri S. Wats.), barnyardgrass [Echinochloa crus-galli (L.) Beauv.], witchgrass (Panicum capillare L.), stinkgrass [Eragrostis cilianensis (All.) E. Mosher], and volunteer of barley (Hordeum vulgare L.), wheat (Triticum aestivum L.), sorghum [Sorghum bicolor (L.) Moench], and corn (Zea mays L.].

METHODS AND MATERIALS

During 1986 through 1989, herbicide effectiveness in the Panhandle of Texas was determined on different sized jointed goatgrass and downy brome, growing on roadsides; and, horseweed and prickly lettuce growing on fallow land. Roadside applications were made in early spring before native vegetation started to grow. The soil was Pullman clay loam. Herbicides and spray additives used along with rates of application are given in tables 1-4. Additional information about the herbicides is in the Appendix. Herbicides were applied in 7 gallons per acre of water at 30 psi through flat fan tips with tractor plot sprayers. As suggested on labels or learned by experience a non-ionic surfactant X-77 or 411F type crop oil concentrate (COC) were added to spray carriers. Plot were from 5 to 15 feet wide and 25 feet long. Treatments were replicated three times in a randomized block design. At time of treatment, plant vigor, which was primarily influenced by soil water, was rated, excellent, good, fair, or poor. Also, plant height and plant growth stage were recorded. Visual estimates of percent control were made from 2 to 6 weeks after treatment. Mean significance was tested with a combination of analysis of variance and least significant difference at $P = 0.05$.

RESULTS

Jointed goatgrass

Best control of jointed goatgrass was obtained when plants were 3 inches tall, in the tiller stage, and with good or excellent plant vigor as a result of adequate soil water for growth (Table 1). Control was not as consistant for 2-inch weeds with poor vigor. Herbicides and application rates (lb/A) causing 95 percent or more control with 3-inch weeds exhibiting good or excellent vigor were: Roundup, 0.38, Landmaster BW, 0.68; Verdict, 0.25, and Fusilade 2000, 0.25. Landmaster BW gave the best over all control with 1.02 lb/A giving 89% or more control at all stages, from 2 to 10 inches. However, Landmaster BW at 1.35 lb/A only gave 76% control of 12-inch jointed goatgrass that was growing in dry soil and had poor vigor indicating that the best of herbicides can not control large drought stressed jointed goatgrass.

Downy brome

Small stages and vigorous growth resulting from ample soil water made downy brome easier to control than when large plants were growing in dry soil (Table 2). However, very good control of plants in the boot stage was obtained when soil water was adequate to promote vigorous growth suggesting plant vigor is as important as stage of growth in determining herbicide effectiveness. Herbicides and rates (lb/A) that gave 95 percent or more control of 2-inch plants with good growing conditions were: Roundup, 0.28; Landmaster BW, 0.53; Assure, 0.016: Fusilade 2000, 0.25; and Verdict, 0.12. Least control was obtained of 8-or 10-inch plants having fair or poor growing conditions. Bugle and Poast caused very little injury to downy brome at any stage of growth or plant vigor.

Horseweed

Three heights of horseweed were treated; 2, 4, and 12 inches. Best control was obtained when 12-inch weeds were sprayed in July under good growing conditions and poorest when weeds were 2-inch rosettes growing in dry soil (Table 3). Herbicides and rates (lb/A) giving 95% or more control of the large vigorous weeds were: 2,4-D ester, 0.5; Banvel, 0.25; AAtrex + 2,4-D, 1+1; Glean, 0.012; Amber, 0.012; Ally, 0.004; Ally + 2,4-D, 0.004 + 0.5; and Harmony, 0.012. With poor growth, 95 percent or more control was obtained with 2,4-D, 2.0; AAtrex + 2,4-D, 1 + 1; Glean, 0.012; and Ally + 2,4-D, 0.004 +0.5.

Prickly lettuce

Prickly lettuce was treated when it was 2 inches tall, in the rosette stage, and having poor vigor because of dry soil (Table 4). Under these unfavorable conditions the only herbicides and rates (lb/A) giving 95 percent or more control were: 2,4-D ester, 2.0; AAtrex + 2,4-D, 3+1; and Ally + 2,4-D, 0.004 + 0.5.

DISCUSSION

These experiments show that most effective and consistent control of jointed goatgrass, downy brome, horseweed, and prickly lettuce growing in fallow fields or roadsides can be obtained with herbicides when weeds are 4 inches tall or less and have ample soil water to promote vigorous growth. Herbicides that gave 95 percent or more control under these conditions are shown in Table 5. All herbicides listed are commercially available except Verdict. More than likely, more than one weed species will be present in a field, so a herbicide must be chosen that will kill all weeds present. If there is doubt, herbicide labels usually list susceptible weeds and an appropriate rate of application.

LITERATURE CITED

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2. Wiese, A. F., E. W. Chenault, and M. L. Wood. 1987. Control of barnyardgrass, volunteer corn, and sorghum with new herbicides. Texas Agric. Exp. Stn. PR-4506. 11 pp.

Table 1. Control of jointed goatgrass at various stages and plant vigor.

Herbicide	Herbicide[a] rate	Jointed goatgrass control					
	(lb/A)	(%)					
Roundup +	0.21	-[b]	-	-	65	17	-
0.5% X-77	0.28	-	-	-	87	85	-
	0.38	-	-	-	98	98	-
Landmaster BW	0.53	-	-	-	63	52	-
	0.68	96	95	93	-	-	23
	0.75	-	-	-	80	78	-
	1.02	99	99	100	97	89	51
	1.35	100	99	98	-	-	76
Paraquat +	0.25	23	50	21	-	-	16
0.5% X-77	0.38	45	45	56	-	-	58
	0.5	45	75	80	13	77	61
Assure + COC[c]	0.016	0	10	13	28	30	10
	0.032	97	18	86	58	28	16
Bugle + COC	0.06	3	0	26	-	-	0
	0.25	7	0	33	7	23	0
Fusilade 2000	0.06	57	7	100	-	-	0
+ COC	0.12	55	7	100	55	27	0
	0.18	-	-	-	53	42	-
	0.25	99	3	100	87	30	6
Poast + COC	0.3	50	7	100	32	55	16
Select + COC	0.06	50	3	100	-	-	6
	0.12	-	-	-	95	78	-
	0.18	-	-	-	96	47	-
	0.25	99	13	100	99	85	33
Verdict + COC	0.06	99	3	50	83	55	3
	0.12	-	-	-	96	75	-
	0.18	-	-	-	97	82	-
	0.25	100	5	100	-	-	3
LSD 0.05		13	19	24	10	11	11
Weed height, inches		3	10	3	2	8	12
Plant vigor		Excellent	Excellent	Good	Fair	Fair	Poor
Plant stage		Tiller	Boot	Tiller	Tiller	Boot	Headed
Treatment date		4-8-87	5-11-87	4-4-86	4-20-88	5-4-88	4-28-86
Evaluation date		5-18-87	6-2-87	4-30-86	5-18-88	5-18-88	5-14-86

[a] Rate of Roundup and Landmaster given in acid equivalent. Others in active ingredient.

[b] Herbicide treatment not applied at this date.

[c] COC = Crop Oil Concentrate used at 1 qt/A.

Table 2. Control of downy brome at various stages and plant vigor.

Herbicide	Herbicide[a/] rate	Downy brome control					
	(lb/A)	(%)					
Roundup +	0.21	-[b/]	53	-	-	62	-
0.5% X-77	0.28	-	93	-	-	75	-
	0.38	-	93	-	-	97	-
Landmaster BW	0.53	-	92	-	-	72	-
	0.68	83	-	78	75	-	58
	0.75	-	96	-	-	77	-
	1.02	90	93	93	93	94	71
	1.35	95	-	97	96	-	76
Paraquat +	0.25	20	-	10	7	-	13
0.5% X-77	0.38	30	-	3	7	-	11
	0.5	73	80	15	0	57	23
Assure + COC[c/]	0.016	77	97	36	82	13	6
	0.032	80	92	93	96	17	40
Bugle + COC	0.06	0	-	0	13	-	0
	0.25	7	0	0	10	0	0
Fusilade 2000	0.06	50	-	21	47	-	45
+ COC	0.12	60	48	23	70	32	58
	0.18	-	84	-	-	28	-
	0.25	67	98	30	88	38	65
Poast + COC	0.3	70	58	13	47	38	66
Select + COC	0.06	20	-	11	28	-	56
	0.12	-	53	-	-	32	-
	0.18	-	57	-	-	42	-
	0.25	82	90	30	88	58	73
Verdict + COC	0.06	30	74	53	90	18	28
	0.12	-	95	-	-	43	-
	0.18	-	92	-	-	23	-
	0.25	50	-	93	88	-	71
LSD 0.05		17	13	8	12	25	7
Weed height, inches		11	2	4	4	8	10
Plant vigor		Excellent	Good	Good	Good	Fair	Poor
Plant stage		Boot	Tiller	Tiller	Tiller	Tiller	Boot
Treatment date		5-11-87	10-23-87	4-4-86	3-6-87	4-20-88	4-28-86
Evaluation date		6-2-87	5-5-87	4-30-86	4-29-87	5-5-88	5-14-86

a/ Rate of Roundup and Landmaster given in acid equivalent. Others in active ingredient.

b/ Herbicide treatment not applied at this date.

c/ COC = Crop Oil Concentrate used at 1 qt/A.

Table 3. Control of horseweed (marestail) at various stages and plant vigor.

Herbicide	Herbicide[a] rate	Horseweed control		
	(lb/A)	(%)		
2-4,D ester	0.5	58	100	47
	1.0	68	99	80
	2.0	80	97	96
2,4-D amine	1.0	57	92	63
Banvel	0.25	57	98	83
	0.5	75	100	88
AAtrex +	1+1	95	89	98
2,4-D ester + COC[b]	3+1	90	99	99
Glean + X-77[c]	0.012	23	100	97
	0.024	42	100	100
Ally + X-77	0.004	38	97	67
Ally + 2,4-D ester + X-77	0.004 + 0.5	32	100	95
Amber + X-77	0.012	47	97	50
	0.024	32	98	50
Harmony + X-77	0.012	3	97	13
	0.024	7	90	7
Express + X-77	0.012	47	93	38
	0.024	58	92	27
Paraquat + X-77	0.25	20	-[d]	43
	0.5	17	0	35
Roundup + Ammonium	0.19	15	-	23
sulfate + X-77	0.28	42	-	43
	0.38	-	-	60
Landmaster BW +	0.51	35	-	50
Ammonium sulfate	0.75	88	-	67
	1.0	95	-	83
LSD 0.05		12	10	23
Weed height, inches		4	12	2
Plant vigor		Good	Good	Poor
Plant stage		5 leaf	Vegetative	Rosette
Treatment date		4-25-88	7-13-88	3-15-89
Evaluation date		5-16-88	8-19-88	4-25-89

[a] Rate of 2,4-D, Banvel, Landmaster and Roundup given in acid equivalent. Others in active ingredient.
[b] COC = Crop Oil Concentrate used at 1 qt/A.
[c] X-77 used at 0.5% of spray mix.
[d] Herbicide treatment not applied at this date.

Table 4. Control of small prickly lettuce with herbicides.

Herbicide	Herbicide[a/] rate	Prickly lettuce control
	(lb/A)	(%)
2-4,D ester	0.5	10
	1.0	87
	2.0	100
2,4-D amine	1.0	70
Banvel	0.25	80
	0.5	77
AAtrex +	1+1	90
2,4-D ester +	3+1	100
COC		
Glean + X-77	0.012	37
	0.024	75
Ally + X-77	0.004	80
Ally + 2,4-D ester + X-77	0.004 + 0.5	99
Amber + X-77	0.012	27
	0.024	23
Harmony + X-77	0.012	18
	0.024	17
Express + X-77	0.012	7
	0.024	20
Paraquat + X-77	0.25	20
	0.5	10
Roundup + Ammonium	0.19	33
sulfate + X-77	0.28	20
	0.38	46
Landmaster BW +	0.51	42
Ammonium sulfate	0.75	86
	1.0	90
LSD 0.05		24
Weed height, inches		2
Plant vigor		Fair
Plant stage		Rosette
Treatment date		3-15-89
Evaluation date		4-25-89

a/ Rate of 2,4-D, Banvel, Landmaster and Roundup given in acid equivalent. Others in active ingredient.

Table 5. Herbicides that gave 95% control or more of vigorous weeds that were not over 4 inches tall.

Jointed goatgrass	Downy brome	Horseweed	Prickly lettuce
Roundup	Roundup	2,4-D ester	2,4-D ester
Landmaster BW	Landmaster BW	Banvel	AAtrex + 2,4-D
Verdict	Assure	AAtrex + 2,4-D	Ally + 2,4-D
Fusilade 2000	Fusilade 2000	Glean	
	Verdict	Amber	
		Ally	
		Ally + 2,4-D	
		Harmony	

APPENDIX

Herbicide Trade name	Common Chemical name	Manufacturer	Formulation [a/]
2,4-D amine	2,4-D	Several	4 lb/gal (ae)
2,4-D ester	2,4-D	Several	4 lb/gal (ae)
AAtrex	atrazine	Ciba-Giegy	90% (ai)
Ally	metsulfuron	DuPont Co.	60% (ai)
Assure	Quizalofop-ethyl	DuPont Co.	0.8 lb/gal (ai)
Banvel	Dicamba	Sandoz	4 lb/gal (ae)
Bugle	Fenoxaprop-ethyl	American Hoechst	1.0 lb/gal (ai)
COC	(411F type) Paraffin base Petroleum oil + Fatty acid esters and polyoxylated derivatives	Terra-Riverside	85% oil 15% surfactant
Express (DPX-L5300)	Tribenuron	DuPont Co.	Several
Fusilade 2000	Fluazifop-p-butyl	ICI Americas, Inc.	1 lb/gal (ai)
Glean	chlorsulfuron	DuPont Co.	80% (ai)
Harmony (DPX-M6316)	Thifensulfuron	DuPont Co.	Several
Landmaster BW	Glyphosate + 2,4-D	Monsanto	0.9 + 1.5 lb/gal (ae)
Paraquat	Parquat	ICI Americas, Inc.	2 lb/gal (ai)
Poast	Sethoxydim	BASF	1.5 lb/gal (ai)
Roundup	Glyphosate	Monsanto	3 lb/gal (ae)
Select	clethodim	Valent	2.0 lb/gal (ai)
Verdict	Haloxyfop-methyl	Dow	2.0 lb/gal (ai)
X-77	alkyaryl polyoxyethylene glycols of free fatty acids and isoproponal	Valent	100%

[a/] ae = acid equivalent and ai = active ingredient.