Control of huisache and honey mesquite with a carpeted roller herbicide applicator

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Abstract

Several herbicides were evaluated for control of honey mesquite (*Prosopis glandulosa* Torr.) and huisache [*Acacia farnesiana* (L.) Willd.] using a tractor-mounted carpeted roller. Foliar sprays of picloram + 2,4,5-T at 0.28 + 0.28 and 0.56 + 0.56 kg/ha were included for comparison. When applied by carpeted roller, picloram at 60 g/L killed about 40% of the honey mesquite plants whereas 120 g/L killed 63 to 83% of the plants after 2 years. Clopyralid at 60 or 120 g/L killed 65% or more of the plants. Mixtures of picloram + clopyralid (1:1) at 30 + 30 g/L killed 53 to 73%, whereas, 60 + 60 g/L killed 83 to 98% of the honey mesquite. Clopyralid + triclopyr (1:1) 30 + 30 g/L killed 48 to 58% of the plants, while 60 + 60 g/L killed 80 to 85%. Picloram + 2,4,5-T (1:1) applied by the carpeted roller was usually more effective than foliar sprays of picloram + 2,4,5-T. For huisache, picloram, clopyralid, or picloram + clopyalid at a total of 60 or 120 g/L killed 60% or more of the plants after 1 year. Picloram + clopyralid at 60 + 60 g/L applied in 1983 and 1984 killed 92% or more of the huisache. Picloram + 2,4,5-T at 60 + 60 g/L killed 73 to 83%, but foliar sprays of picloram + 2,4,5-T were sometimes ineffectve. Glyphosate, dicamba, triclopyr and 2,4,5-T applied alone reduced the canopy of honey mesquite and huisache but usually killed few plants. Honey mesquite was controlled from spring applications, whereas, summer and fall treatments controlled huisache.

Key Words: picloram, clopyralid, triclopyr, dicamba, glyphosate, 2,4,5-T, canopy reduction, mortality

Herbicide foliar sprays are usually superior to soil treatments for control of honey mesquite (*Prosopis glandulosa* Torr.) and huisache [*Acacia farnesiana* (L.) Willd.] (Bovey and Meyer 1978, Bovey and Meyer 1981). Since these species sometimes occur on grazing lands in crop areas, foliar sprays of herbicide cannot be used because of possible damage from spray drift. These species are also rapid and persistent invaders of improved pastures such as bermudagrass [(*Cynodon dactylon* L.) Pers.], and herbicide foliar sprays on the forage may be undesirable because of injury or herbicide residues.

A carpeted roller for conrol of small shrubs and honey mesquite has been developed (Mayeux and Crane 1984, 1985). The roller consisted of a polyvinyl chloride (PVC) cylinder covered with common household carpet. Acceptable control of honey mesquite was obtained with picloram (4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid) or clopyralid (3,6-dichloro-2-pyridinecarboxylic acid) when wiped onto the foliage under favorable growing conditions. Solutions containing 120 g/L of herbicide were sometmes only slightly more effective than solutions containing 30 g/L active ingredient of herbicides. In dense stands of honey mesquite, Mayeux (1987a) found that picloram, but not 2,4,5-T [(2,4,5-trichlorophenoxy)acetic acid], was effective at 60 g/L from August and September treatments as well as June applications. Clopyralid or clopyralid + picloram was also effective in spring or fall. In honey mesquite, rates of application of herbicide applied with the carpeted roller at concentrations of 30, 60, and 120 g/L averaged about 0.2, 0.6 and 1.25 kg ae/ha, respectively (Mayeux 1987b). Height of plants had no influence on volume of solution applied, but volume required to treat a given area increased with mesquite density. Active ingredient of herbicide applied to individual plants (0.3 to 3 g/shrub) decreased in a curvilinear manner with increasing stand density, suggesting that the carpeted roller is most effective in treating sparse stands. Waddington and Bittman (1987) attempted to control dense regrowth of aspen poplar (*Populus tremuloides* Michx.) and willows (*Salix* spp.) by passing a roller applicator several times in different directions using 2,4-D [(2,4-dichlorophenoxy)acetic acid], 2,4-D + picloram or glyphosate [*N*-(phosphonomethyl)glycine]. Control of regrowth was in proportion to the number of passes made.

Information concerning the use of the carpeted roller to control huisache is limited. Preliminary data from greenhouse-grown plants indicated that picloram and clopyralid were more effective than triclopyr [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid or dicamba (3,6-dichloro-2-methyoxybenzoic acid) (Bovey et al. 1981) and that the use of a surfactant (0.5% v/v) in the treating solution significantly increased canopy reduction and mortality, especially at lower concentrations of herbicide (Mayeux and Bovey 1988). Scifres et al. (1988) recently indicated that picloram, clopyralid and equal-ratio mixtures of these herbicides reduced the live canopy of huisache by 90% or more by 2 years after treatment, but the least concentration that provided acceptable control was not indicated. None of the investigations mentioned compared a standard herbicide foliar treatment with the carpeted roller applicator.

The primary objective of this study was to evaluate the effectiveness of the carpeted roller applicator with a standard foliar herbicide application for control of honey mesquite and huisache, to identify effective herbicides and rates for acceptable control, and to evaluate certain herbicide mixtures and carriers in east central Texas. Summer and fall applications were also made on huisache to determine if fall application could be used to control huisache.

Materials and Methods

Dense stands of honey mesquite or huisache 1 to 2 m tall were treated. Multistemmed honey mesquite occurred on a Wilson clay loam (Vertic Ochraqualfs) while huisache occurred on a Bleiblerville clay (Udic Pellusterts) near Bryan and Washington, Texas, respectively. The plants consisted of vigorous regrowth from mechanical brush control several years before. Herbicides applied were the isopropylamine salt of glyphosate, the dimethylamine salt of dicamba, the propylene glycol butyl ether ester of 2,4,5-T, the butoxyethyl ester of triclopyr, the potassium salt of picloram, the triisopropanolamine salt of picloram + the propylene glycol butyl ether ester of 2,4,5-T (1:1), the monoethanolamine salt of clopyralid, the ethyl ester of benazolin (4-chloro-2-oxo-3(2*H*)-benzothiazoleacetic acid), and certain combinations of these formulations.

Herbicides were applied at total concentrations of 60 or 120 g/L,

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unless stated otherwise, with a carpeted roller mounted in place of a bulldozer blade on the front of a small tracklayer tractor. The roller was a 2.4-m-long by 21-cm-diameter aluminum cylinder rotated at 45–50 rpm by a hydraulic motor in reverse direction of the forward motion of the tractor. Rotating the roller maximized application of herbicide on brush and minimized dripping. Herbicide solutions were supplied to the roller from a spray boom and spraying system on the tractor. Nine Teejet flat fan nozzles, Tip No. 9505 (Spraying Systems Co., North Ave., Wheaton, Ill. 60188), spread 27 cm apart and 29 cm above the roller were activated periodically to keep the carpet saturated. The roller was covered with common household nylon carpet with a dense mat of medium nap length. The carpet was secured to the roller by either steel bands or rubber stretch bands.

Height of the roller could be adjusted hydraulically during operation depending upon the height of the brush. Generally the roller was operated about 30 to 60 cm above ground, bending the plants over to maximize herbicide wiping. Different carpets were marked and attached for each herbicide or herbicide mixture. A standard spray treatment was included for comparison. Sprays of picloram + 2,4,5-T in 1:1 ratio mixture was applied at a total of 0.56 or 1.1 kg/ha in 187 L/ha of water with either a compressed air, hand-carried, 3 nozzle boom sprayer or a 9 nozzle tractor mounted sprayer. Sprays were applied at the same time as the carpeted roller treatments.

Herbicides were applied to honey mesquite on 6 July 1983, 15 June 1984, and 12 June 1985. Treatments on huisache were made on 26 July and 7 December 1982, 20 October 1983, 15 July 1985, and 14 July 1986. All experiments were randomized complete block designs with 2 replications. Plot size was 15 by 45 m. Treatments were evaluated by visually estimating percent canopy reduction and mortality of 20 plants in each replicate 1 to 2 years after treatment. Plants with 100% canopy reduction and no live tissue or resprouts were considered dead. Data were subjected to analysis of variance, and means were compared by the least significant difference at the 5% level. Data were also analyzed as arcsine-transformed values (Steel and Torrie 1980), but there was no meaningful difference between the 2 analyses.

Results and Discussion

Huisache

Glyphosate, dicamba, triclopyr, and 2,4-5-T were essentially ineffective for killing huisache when applied either in July or December 1982 (Table 1). Herbicide 2,4,5-T at 240 g/L killed 38% of the plants in the December application, but picloram at 120 g/L or picloram + 2,4,5-T at 60 + 60 g/L killed 78% or more of the plants. Picloram and picloram + 2,4,5-T killed 60 to 80% of the plants from June and December applications. Foliar sprays of picloram + 2,4,5-T at 0.56 + 0.56 kg/ha killed 60% of the huisache plants in the July application but killed no plants when applied in December 1982. Possibly the huisache was approaching dormancy in December since extensive natural defoliation had occurred before treatment, and fewer leaves were available for herbicide absorption from foliar sprays than in July. Rainfall, however, was more favorable before and after treatment in December than July 1982 (Table 2).

Table 1. Response of huisache near Washington, Texas, to herbicides by 2 August 1983 after application by a carpeted roller on two dates in 1982.

Herbicide(s)	Rate	Date applied: 26 July 1982 Canopy reduction	26 July 1982 Dead plants	7 December 1982 Canopy reduction	7 December 1982 Dead plants
	(g/L a.e.)	(%)			
Glyphosate	180	32	5	40	0
Dicamba	240	29	0	34	2
Triclopyr	240	57	25	52	5
2,4,5-T	240	60	10	74	38
Picloram	120	84	60	92	80
Picloram+ 2,4,5-T	60+60	84	75	92	78
Picloram + 2,4,5-T	0.56+0.56[1] kg/ha	83	60	8	0
Untreated		6	0	4	0

LSD (5%) for canopy reduction = 22; for dead plants = 32

[1]Applied by hand boom sprayer.

Foliar sprays of picloram + 2,4,5-T at 0.56 + 0.56 kg/ha were effective when applied in October 1983, reducing the canopy by 90% and killing 82% of the huisache (Table 3). Sprays of picloram + 2,4,5-T at 0.28 + 0.28 kg/ha only reduced the canopy 60% and killed 48% of the huisache. Carpeted roller treatments that reduced the canopy by 92% or more and killed more than 88% of the plants included clopyralid and picloram + clopyralid at a total of 60 and 120 g/L herbicide.

Picloram + clopyalid at 30 + 30 g/L + 20 g/L benazolin was no more effective than picloram + clopyralid alone at the same rate (Table 3). However, picloram + 2,4,5-T at 30 + 30 g/L in a 1:4 (v/v) diesel oil:water carrier was as effective as picloram + 2,4,5-T at 60 + 60 g/L in water carrier. Picloram alone at 60 and 120 g/L killed 75 and 82% of the plants, respectively. Glyphosate, dicamba and 2,4,5-T applied alone were ineffective, whereas triclopyr at 60 or 120 g/L, picloram + dicamba, or picloram + 2,4,5-T at 30 + 30 g/L was intermediate in effect, killing about 40 to 55% of the plants. Rainfall was favorable before and after treatment (Table 2). These data agree with greenhouse investigations using a model carpeted roller that indicated that picloram, clopyralid, or mixtures of picloram + clopyralid were the most effective of several herbicides evaluated against juvenile huisache (Mayeux and Bovey 1988).

Fall applications of foliar sprays of picloram + 2,4,5-T are some-

Table 2. Rainfall 1 or 2 months before or after herbicide treatment near the experimental sites.[1]

Species	Months: Before 1	Before 2	After 1	After 2	Total for year and departure from the long-term mean
	(cm)				
Huisache					
26 Jul 1982	5.3	7.7	1.4	5.7	93.5 -6.7
7 Dec 1982	14.3	33.6	5.8	14.8	93.5 -6.7
20 Oct 1983	6.2	13.7	8.5	18.2	137.9 38.0
15 Jul 1985	12.0	14.3	6.3	3.8	103.6 3.7
14 July 1986	2.6	22.2	1.7	15.4	109.4 9.5
Honey mesquite					
6 Jul 1983	6.8	35.8	5.5	19.5	122.3 23.1
15 Jun 1984	18.4	18.4	6.3	12.8	97.6 -1.7
12 Jun 1985	4.8	15.1	7.4	13.2	96.9 -2.4

[1]Rainfall amounts from *Climatological Data,* U.S. Dep. Commerce Nat. Climatic Center, Fed Bldg., Asheville, NC, as collected at Washington, Texas (huisache) and at College Station, Texas (honey mesquite).

Table 3. Response of huisache near Washington, Texas, to herbicides by 19 July 1984 after application by a carpeted roller on 20 October 1983.

Herbicide(s)	Rate	Huisache control	
		Canopy reduction	Dead plants
	(g/L a.e.)	(%)	
Glyphosate	60	19	5
Dicamba	60	12	0
Dicamba	120	30	0
Triclopyr	60	56	40
Triclopyr	120	71	50
2,4,5-T	60	36	18
Picloram	60	82	75
Picloram	120	86	82
Clopyralid	60	97	92
Clopyralid	120	92	88
Picloram + 2,4,5-T	30+30	58	42
Picloram + 2,4,5-T	60+60	86	85
Picloram + 2,4,5-T	0.28+0.28 kg/ha[1]	60	48
Picloram + 2,4,5-T	0.56+0.56 kg/ha[1]	90	82
Picloram + 2,4,5-T	30÷30[2]	92	85
Picloram + clopyralid	30+30	96	95
Picloram + clopyralid	60+60	99	98
Picloram + clopyralid	30+30[3]	93	90
Picloram + dicamba	30+30	68	55
Untreated	——	10	0
LSD (5%) for column		27	30

[1]Applied by hand boom sprayer.
[2]1:4 (v/v) diesel oil:water carrier.
[3]Treating solution contained 20 g/L a.e. benazolin [4-chloro-2-oxo-3(2*H*)-benzo-thiazole acetic acid].

times more effective on huisache than spring or summer applications (Bovey et al. 1972). Also, foliar sprays of picloram at 2.2 kg/ha or picloram + 2,4,5-T at 1.1 + 1.1 kg/ha is sometimes required to provide huisache mortality exceeding 80% (Bovey et al. 1970). In this study foliar sprays of 0.56 + 0.56 kg/ha of picloram + 2,4,5-T killed 47 and 3% huisache in 1985 and 1986, respectively (Table 4). Picloram + 2,4,5-T spray at 0.28 + 0.28 kg/ha was ineffective. Rainfall was limited 1 and 2 months after treatment in 1985 and 1 month before and after treatment in 1986. Reduced plant growth from drought probably reduced transport and activity of the foliar applied herbicides.

Application of clopyralid, picloram, picloram + 2,4,5-T, picloram + clopyralid or picloram + dicamba with the carpeted roller killed a high percentage of huisache plants in 1985 where adequate rainfall preceded treatment (Table 4). Picloram + clopyralid and picloram + dicamba were particularly effective, killing 95% or more of the huisache plants. Glyphosate, dicamba, triclopyr and 2,4,5-T reduced the canopy as much as 85% but killed only 35% or less of the plants. Treatments applied in 1986 generally killed fewer plants than in 1985 where rainfall was limited for a long period of time before and after treatment.

Honey mesquite

In actual field use, foliar sprays of picloram + 2,4,5-T have been applied at recommended rates of 0.28 + 0.28 kg/ha to 0.56 + 0.56 kg/ha (Bovey and Meyer 1981). In this study, these herbicides caused 31 and 73% canopy reduction and killed 3 and 48% of the plants, respectively, by 2 years after treatment (Table 5). Mortality of honey mesquite was about as expected for foliar sprays of picloram + 2,4,5-T at these rates in east Texas. Canopy reduction and mortality of picloram + 2,4,5-T applied by the carpeted roller were similar to foliar sprays. Picloram + 2,4,5-T at 30 + 30 g/L applied in a 1:4 (v/v) diesel oil:water carrier appeared superior to water carrier alone after 1 year but was no different by the second year (1985) after application. Carpeted wiper treatments that killed 78% or more of the plants included picloram at 120 g/L, clopyralid

Table 4. Response of huisache near Washington, Texas, to herbicides by 13 May 1986 and 5 May 1987 after application by a carpeted roller on 15 July 1985 and 14 July 1986, respectively.

Herbicide(s)	Rate	Date applied			
		15 July 1985		14 July 1986	
		Canopy reduction	Dead plants	Canopy reduction	Dead plants
	(g/L a.e.)	(%)			
Glyphosate	60	58	10	57	13
Dicamba	60	78	20	67	15
Dicamba	120	80	23	80	20
Triclopyr	60	64	5	63	13
Triclopyr	120	76	33	78	25
2,4,5-T	60	85	35	67	10
Picloram	60	96	88	97	85
Picloram	120	97	93	89	68
Clopyralid	60	93	85	65	20
Clopyralid	120	90	88	99	90
Picloram + 2,4,5-T	30+30	96	70	89	63
Picloram + 2,4,5-T	60+60	98	83	96	73
Picloram + 2,4,5-T	0.28+0.28 kg/ha[1]	62	5	29	0
Picloram + 2,4,5-T	0.56+0.56 kg/ha[1]	70	47	37	3
Picloram + 2,4,5-T	30÷30[2]	94	85	91	70
Picloram + clopyralid	30+30	100	98	89	60
Picloram + clopyalid	60+60	100	98	97	80
Picloram + clopyralid	30+30[3]	100	98	92	58
Picloram + dicamba	30+30	94	95	80	38
Untreated	——	2	0	6	0
LSD (5%) for column		14	15	14	22

[1]Applied by hand boom sprayer.
[2]1:4 (v/v) diesel oil: water carrier.
[3]Treating solution contained 20 g/L a.e. benazolin [4-chloro-2-oxo-3(2*H*)-benzo-thiazole acetic acid].

at 60 and 120 g/L, and picloram + clopyralid at 60 + 60 g/L. Picloram + clopyralid at 30 + 30 g/L + 20 g/L benazolin killed 80% of the honey mesquite but was no different than the same treatment without benazolin. All of these carpeted roller treatments were superior to foliar sprays of picloram + 2,4,5-T. Glyphosate, dicamba, triclopyr and 2,4,5-T applied by the carpeted roller killed only 15% or less of the plants. Canopy reduction and mortality evaluations were similar whether taken 1 or 2 years after treatment although some treatments showed more regrowth by the second year.

Foliar sprays of picloram + 2,4,5-T were ineffective in killing honey mesquite by 1 or 2 years after spraying when applied in June 1984 (Table 6). The reasons for poor results is not clear; timing of treatment and rainfall amounts (Table 2) were satisfactory. Canopy reduction and mortality from picloram + 2,4,5-T applied by carpeted roller were superior to foliar sprays of picloram + 2,4,5-T as were picloram, clopyralid or mixtures of picloram + clopyalid. Picloram + clopyralid at 60 + 60 g/L killed 98% of the plants. Clopyralid + triclopyr at 30 + 30 or 60 + 60 g/L killed 58 and 80% of the plants after 2 years, respectively. Sprays of clopyralid + picloram or clopyralid + triclopyr are highly effective on honey mesquite at 0.28 + 0.28 kg/ha and 0.56 + 0.56 kg/ha (Bovey and Meyer 1985). In this study, picloram + dicamba at 30 + 30 or 60 + 60 g/L killed about the same percentage of plants as picloram alone at 60 g/L (35 to 60%). Glyphosate, dicamba, triclopyr and 2,4,5-T killed

Table 5. Response of honey mesquite near Bryan, Texas, to herbicides by 7 August 1984 and 6 August 1985 after application by a carpeted roller on 6 July 1983.

Herbicide(s)	Rate	Date evaluated			
		1984		1985	
		Canopy reduction	Dead plants	Canopy reduction	Dead plants
	(g/L a.e.)	(%)			
Glyphosate	60	38	5	22	0
Glyphosate	120	55	8	30	3
Dicamba	60	48	3	30	5
Dicamba	120	71	10	30	8
Triclopyr	60	53	5	24	0
Triclopyr	120	65	3	25	0
2,4,5-T	60	58	15	39	10
2,4,5-T	120	63	0	36	0
Picloram	60	75	43	66	40
Picloram	120	97	83	93	78
Clopyralid	60	99	95	99	98
Clopyralid	120	98	80	90	78
Picloram + 2,4,5-T	30+30	84	30	58	23
Picloram + 2,4,5-T	60+60	89	50	68	35
Picloram + 2,4,5-T	0.28+0.28 kg/ha[1]	68	20	31	3
Picloram + 2,4,5-T	0.56+0.56 kg/ha[1]	88	40	73	48
Picloram + 2,4,5-T	30+30[2]	94	78	69	45
Picloram + clopyralid	30+30	96	73	87	73
Picloram + clopyralid	60+60	98	85	90	83
Picloram + clopyralid	30+30[3]	98	83	94	80
Untreated	——	3	0	2	0
LSD (5%) for column		14	24	20	24

[1]Applied by hand boom sprayer.
[2]1:4 (v/v) diesel oil:water carrier.
[3]Treating solution contained 20 g/L a.e. benazolin [4-chloro-2-oxo-3(2*H*)-benzothiazole acetic acid].

Table 6. Response of honey mesquite near Bryan, Texas, to herbicides by 6 August 1985 and 25 June 1986 after application by a carpeted roller on 15 June 1984.

Herbicide(s)	Rate	Date applied			
		1985		1986	
		Canopy reduction	Dead plants	Canopy reduction	Dead plants
	(g/L a.e.)	(%)			
Glyphosate	60	55	8	33	5
Glyphosate	120	77	35	35	8
Dicamba	60	61	15	61	35
Dicamba	120	86	43	46	13
Triclopyr	60	78	10	47	5
Triclopyr	120	95	60	67	33
2,4,5-T	60	65	5	50	18
2,4,5-T	120	85	40	55	10
Picloram	60	90	60	71	43
Picloram	120	98	93	93	83
Clopyralid	60	92	78	81	65
Clopyralid	120	99	90	91	83
Picloram + 2,4,5-T	30+30	87	60	66	43
Picloram + 2,4,5-T	60+60	97	80	80	53
Picloram + 2,4,5-T	0.28+0.28 kg/ha[1]	53	3	30	3
Piclorm + 2,4,5-T	0.56+0.56 kg/ha[1]	64	3	35	8
Picloram + 2,4,5-T	30+30[2]	88	55	76	50
Picloram + clopyralid	30+30	96	83	97	58
Picloram + clopyralid	60+60	100	100	99	98
Picloram + clopyralid	30+30[3]	97	88	83	63
Picloram + dicamba	30+30	88	60	64	35
Picloram + dicamba	60+60	89	60	71	50
Clopyralid + triclopyr	30+30	96	75	83	58
Clopyralid + triclopyr	60+60	95	73	93	80
Untreated	——	4	0	4	0
LSD (5%) for column		9	17	18	26

[1]Applied by hand boom sprayer.
[2]1:4 (v/v) diesel oil:water carrier.
[3]Treating solution contained 20 g/L a.e. benazolin [4-chloro-2-oxo-3(2*H*)-benzothiazole acetic acid].

35% of the plants or less by 2 years after treatment.

Carpeted roller treatments of picloram, clopyralid, picloram + clopyralid, picloram + dicamba and clopyralid + triclopyr were superior to foliar sprays of picloram + 2,4,5-T (Table 7). Carpeted roller treatments of picloram + 2,4,5-T at 60 + 60 g/L killed more honey mesquite than foliar sprays of picloram + 2,4,5-T. Picloram + 2,4,5-T at 30 + 30 g/L also killed more plants thay sprays of picloram + 2,4,5-T at 0.28 + 0.28 kg/ha. Treatments that killed over 80% of the plants included clopyralid at 60 g/L, picloram + clopyralid at 60 + 60 g/L, picloram + clopyralid + benazolin at 30 + 30 + 20 g/L, respectively, and clopyralid + triclopyr at 60 + 60 g/L. Ineffective treatments were glyphosate, dicamba, triclopyr and 2,4,5-T. Honey mesquite mortality from foliar sprays of picloram + 2,4,5-T was within the expected range (Bovey and Meyer 1981). Rainfall amounts were low 1 month before treatment (Table 2).

Mayeux (1987b) indicated that rates of application of herbicide applied to honey mesquite with the carpeted roller at concentrations of 30, 60, and 120 g/L averaged about 0.2, 0.6, and 1.25 kg a.e./ha. Based on this criterion, foliar sprays of picloram + 2,4,5-T at 0.28 + 0.28 and 0.56 + 0.56 kg/ha for a total of 0.56 and 1.1 kg/ha would be comparable to 60 and 120 g/L applied by the carpeted roller on a herbicide/ha basis. Amount of herbicide used and cost/ha should be comparable. The carpeted roller treatments, however, were usually more effective than the herbicide sprays on both huisache and honey mesquite. This is probably due to a greater concentration of herbicide being applied to each plant by the carpeted roller.

These studies demonstrate that picloram or clopyralid at rates of 60 or 120 g/L or 1:1 mixtures of picloram + clopyralid or picloram + 2,4,5-T applied by the carpet roller are highly effective for reducing the canopy and causing high mortality of huisache from summer and fall treatments. Picloram + 2,4,5-T applied by the carpeted roller was sometimes more effective than sprays of the same mixture. Picloram, clopyralid, or 1:1 mixtures either of picloram + clopyralid or clopyralid + triclopyr were most effective for control honey mesquite applied in June or July. Small, dense, (<2 m tall) honey mesquite and/or huisache and associated weeds can be controlled using the carpeted roller near sensitive crops and domestic areas, thus minimizing herbicide residues to non-target, hay or grazing areas before the species become too large and unmanageable.

Table 7. Response of honey mesquite near Bryan, Texas, to herbicides by 23 June 1986 after application by a carpeted roller on 12 June 1985.

Herbicide(s)	Rate	Honey mesquite control	
		Canopy reduction	Dead plants
	(g/L a.e.)	(%)	
Glyphosate	60	52	13
Glyphosate	120	51	5
Dicamba	60	52	3
Dicamba	120	57	10
Triclopyr	60	42	0
Triclopyr	120	68	13
2,4,5-T	60	74	10
2,4,5-T	120	57	3
Picloram	60	75	40
Picloram	120	93	63
Clopyralid	60	95	83
Picloram + 2,4,5-T	30+30	72	28
Picloram + 2,4,5-T	60+60	85	48
Picloram + 2,4,5-T	0.28+0.28 kg/ha[1]	24	3
Picloram + 2,4,5-T	0.56+0.56 kg/ha[1]	65	23
Picloram + 2,4,5-T	30+30[2]	68	10
Picloram + clopyralid	30+30	93	73
Picloram + clopyralid	60+60	98	90
Picloram + clopyralid	30+30[3]	96	88
Picloram + dicamba	30+30	84	48
Picloram + dicamba	30+30	87	60
Clopyralid + triclopyr	30+30	86	48
Clopyralid + triclopyr	60+60	98	85
Untreated	——	6	0
LSD (5%) for column		12	16

[1]Applied by hand boom sprayer.
[2]1:4 (v/v) diesel oil:water carrier.
[3]Treating solution contained 20 g/L a.e. benazolin [4-chloro-2-oxo-3(2*H*)-benzothiazole acetic acid] and 1% (v/v) surfactant (trimethyl nonylpoly ethoxyethanol).

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