

# BRUSH MANAGEMENT ON THE CROSS TIMBERS EXPERIMENTAL RANGE: I. BRUSH PROBLEMS AND RESPONSES TO HERBICIDES

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## Story in Brief

The major brush problem on the Cross Timbers Experimental Range area was post oak and blackjack oak. The oak canopy accounted for over 60% of the total overstory canopy cover on the sandy savannah range site and for over 80% of the total overstory canopy cover on the shallow savannah range site.

Two herbicide treatments, tebuthiuron, a soil-active applied herbicide and triclopyr, a foliage-active herbicide, were applied by air to Cross Timbers areas in 1983. Environmental conditions were favorable for good defoliation and control of the susceptible brush species with both herbicides. Canopy reduction and tree kill of both post oak and blackjack oak, the major brush problem, were excellent with both herbicides. There were some differences in herbicide activity on the other brush species with tebuthiuron being the most active. Thus, better total tree kill was achieved with tebuthiuron.

Key words: Brush Control, Herbicides, Tebuthiuron, Triclopyr

## Introduction

The Cross Timbers Experimental Range (CTER) is situated in the western range of the Cross Timbers. The major brush vegetation was post oak and blackjack oak. Some of the level non-rocky areas had been cultivated in the early 1930's, but have been through 40 years of succession since that time. The majority of the brush on the CTER area was never cleared and has not been subjected to mechanical or chemical control treatments.

The CTER area was assigned to the Agronomy and Animal Science Departments in Spring of 1981. The area was divided into 80-acre pastures. Clearing and fencing started in 1982. Brush on the site was inventoried in late summer of 1982 and that data has been summarized (Ewing et al., 1984). A summary of the brush canopy cover before the herbicide applications is listed in Table 1.

The CTER Project was initiated to evaluate the impact of "Brush Management" on the Cross Timbers. A number of brush control treatments (including mechanical and herbicides) have been evaluated in Oklahoma for brush control. Brush management is more inclusive than brush control in that brush management assumes 1) where woody plants are well adapted, complete eradication is neither ecologically possible or economically feasible, 2) a certain amount of woody vegetation may be desirable for shade, cover, browse, erosion control or nutrient cycling; 3) retreatment practices are usually of a different nature and less costly than initial treatments; and 4) periodic retreatments are scheduled as part of the range management plan.

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Table 1. Pretreatment (1982) canopy cover of brush species on shallow and sandy savannah range sites on CTER area (Ewing et al., 1984).

Brush Species	Shallow Savannah		Sandy Savannah	
	Over-story	Under-story	Over-story	Under-story
	------(%)-----			
Post oak ( <i>Quercus stellata</i> )	66	3	52	2
Blackjack Oak ( <i>Quercus marilandica</i> )	20	1	21	1
Roughleaf dogwood ( <i>Cornus drummondii</i> )	4	1	9	3
Eastern redcedar ( <i>Juniperus virginiana</i> )	3	2	3	1
Chittamwood ( <i>Bumelia lanuginosa</i> )	3	1	1	1
Redbud ( <i>Cercis canadensis</i> )	2	1	5	2
Hackberry ( <i>Celtis</i> spp.)	2	1	4	1
Greenbrier ( <i>Smilax bona-nox</i> )	1	2	1	1
American elm ( <i>Ulmus americana</i> )	1	1	4	1
Chinkapin oak ( <i>Quercus muehlenbergii</i> )	1	1	11	1
Buckbrush ( <i>Symphoricarpos orbiculatus</i> )	1	7	0	5
Mexican plum ( <i>Prunus mexicana</i> )	0	1	0	1
Sumac ( <i>Rhus</i> spp.)	0	1	0	1
Blackberry ( <i>Rubus</i> spp.)	0	1	0	1

At the initiation of this study, sufficient herbicide evaluations had been done to establish that good tree kill could be obtained from foliage-applied herbicides and soil-applied herbicides (Stritzke, 1981). A summary of 22 experiments where 2 lb/A of 2,4,5-T was applied, indicated that tree kill of blackjack oak varied from 0 to 72% with an average of 23%. Tree kill of post oak with 2 lb/A of 2,4,5-T varied from 8 to 90% with an average tree kill of 40%. Tree kill of blackjack oak and post oak with 2 lb/A of tebuthiuron for 18 experiments averaged 81 and 91 %, respectively. A newer foliage-applied herbicide, triclopyr, has been found to be more effective on blackjack and post oaks than 2,4,5-T and can be considered as a good substitute for 2,4,5-T, especially since 2,4,5-T is no longer available (Stritzke, unpublished data).

The brush control objective of the CTER project was to compare an effective foliage-applied herbicide (triclopyr) with an effective soil-applied herbicide (tebuthiuron). Differences in the root kill between the two herbicides should result in two different levels of resprouting.

#### Material and Methods

Tebuthiuron (40% pellets) was applied by air at 2 lb/A of active material on March 18, 1983. Eight 80-acre pastures were treated. Rainfall after treatment was excellent to move the herbicide into the soil (2.23 inches in March after treatment 1.63 inches in April, and 7.43 inches in May). Triclopyr ester (2 lb/A of actual) was mixed with diesel and aerially applied to eight, 80 acre pastures as a oil-in-water emulsion on June 21, 1983. Environmental conditions and tree growth were satisfactory for good foliage uptake and herbicide activity of triclopyr. First year defoliation, second year crown reduction, and apparant tree kill in the second year were visually estimated on 40

individual trees of each species in each pasture. Defoliation estimates were taken October 24, 1983, and crown reduction and tree kill data were taken October 8, 1984.

### Results and Discussion

The first year defoliation of most brush species was excellent with both herbicide treatments (Table 2). However, defoliation of both chittamwood and buckbrush with triclopyr was not satisfactory. Crown reduction with tebuthiuron was good to excellent on most brush species, whereas crown reduction with triclopyr varied from 18% on buckbrush to 100% on sumac (Table 2). There was also good to excellent tree kill with tebuthiuron ranging from a low of 52% on chittamwood to a high of 99% on plums. Tree kill with triclopyr was much more variable, being as low as 8% on buckbrush and as high as 100% on sumac.

Canopy reduction and tree kill of the major brush problem (post oak and blackjack oak) were excellent with both herbicides (over 78% of the trees killed). This would mean that brush control with both herbicides should be sufficient to allow good grass release. Since buckbrush was not adequately controlled with triclopyr, it could become a major brush problem within three to four years. Also, the decreased tree kill of some of the other brush species with triclopyr will probably mean that brush will decrease forage production much sooner in triclopyr than in the tebuthiuron-treated pastures.

There was no control of eastern redcedar or greenbriar by either of the herbicides. This means that these two brush species will be released by the control of the brush. Both of these species were present as overstory and understory on both savannah sites. In addition to this, eastern redcedar was present on the open prairie sites.

**Table 2. Brush control of brush species on CTER with tebuthiuron and triclopyr.**

Brush Species	Tebuthiuron			Triclopyr		
	D <sup>a</sup>	C <sup>b</sup>	T <sup>c</sup>	D	C	T
	------(%)-----					
American elm	70	86	79	67	41	24
Blackjack oak	99	100	98	98	94	78
Buckbrush	96	74	56	52	18	8
Chinkapin oak	- <sup>d</sup>	98	90	-	88	74
Chittamwood	84	74	52	59	40	16
Hackberry	98	78	64	75	44	33
Mexican plum	-	99	99	-	94	88
Post oak	99	99	98	96	97	92
Redbud	95	83	66	94	77	63
Roughleaf dogwood	96	91	81	96	72	54
Sumac	96	98	98	100	100	100

<sup>a</sup>Defoliated, year of treatment.

<sup>b</sup>Crown reduction, year after treatment.

<sup>c</sup>Tree kill, year after treatment.

<sup>d</sup>No data taken.

Burning in 1985 and 1986 following the two herbicide treatments was fairly effective in controlling cedar trees under 4 feet tall in the open prairies. However, fire did not effectively penetrate the heavy brush areas due to lack of fine fuel. As warm-season grasses increase where the brush has been controlled, it is expected that good control of smaller eastern redcedar trees and greenbriar will result.

#### Literature Cited

- Ewing, A.L., et al. Vegetation of the Cross Timbers Experimental Range, Payne County, Oklahoma. P-856. 40pp.  
 Stritzke, J.F. 1981. Current status of blackjack oak and post oak control in Oklahoma. Proc. Soc. for Range Mgmt., p. 35.