CHEMICAL CONTROL OF MESQUITE, CREOSOTEBUSH, AND CATCLAW MIMOSA WITH TEBUTHIURON AND SUBSEQUENT GRASS PRODUCTION

James T. Nelson and Charles Vick

ABSTRACT

Mortality of mesquite, catclaw mimosa and creosotebush treated with 1.5 lbs. ai/ac of tebuthiuron in April of 1984, and resulting grass production was determined on a draw site and a gravelly site in south Brewster County, Texas. Brush mortality 3 years post-treatment on the draw site was 10% for mesquite, 55% for creosotebush (Larrea tridentata DC.) and 75% for catclaw mimosa (Mimosa biuncifera Benth.). Mortality on the gravelly site was 0% for mesquite (Prosopis glandulosa Torr.), 94% for creosotebush and 100% for catclaw mimosa. Grass production was increased more on the gravelly site (960 lbs/ac on the treated area vs. 161 lbs/ac on the untreated) than on the draw site (509 lbs/ac on the treated area vs. 133 lbs/ac on the untreated control). Forb production was decreased on both treated sites. The lesser degree of grass response on the draw site was attributed to lack of mesquite control on that site.

INTRODUCTION

Brush treatment with herbicides has been a part of range improvement systems for more than 25 years (Scifres et al. 1977). Dense stands of brush reduce forage production and restrict movement of livestock (Smith and Rechenthinn, 1964).

Tebuthiuron is an effective control agent for creosotebush, tarbush (**Flourensia cernua** DC.) and mesquite in the southwest (Jacoby et al., 1982; Ibarra and Morton, 1984; Herbel et al., 1985). Increases in grass production following brush control with tebuthiuron have been shown on sand-shinnery oak (**Quercus havardii** Rydb.) (Jones and Pettit, 1984), and application of tebuthiuron may also increase crude protein content of forage grasses and subsequent grazing perference of grasses by cattle (Masters and Scifres, 1984).

Tebuthiuron is a substituted urea compound originated by Elanco Products Company under the Division of Eli Lilly and Company in 1972. It is readily absorbed through the root system with moisture and inhibits photosynthesis. Once in the woody plant it takes 2-3 years to complete the control cycle. At the time of this study, it was marketed in pelleted form under the trade name "Graslan" (presently marketed as "Spike").

This study was conducted to determine (1) mortality of shrub species treated with pelleted tebuthiuron and (2) the resulting grass production on two sites in south Brewster County, Texas.

MATERIALS AND METHODS

The study areas were approximately 16 miles south of Marathon, Texas, in a desert grassland/desert shrub community dominated by creosotebush, mesquite and catclaw mimosa. Research plots were in a draw range site and in a gravelly range site. Sand dropseed (**Sporobolus cryptandrus** Torr.), whiplash papusgrass (**Pappophorum mucronulatum** Nees.), and burrograss (**Scleropogon brevifolius** Phil.) were the dominant grasses on the draw site and red grama (**Bouteloua trifida** Thurb.) was the dominant grass on the gravelly site. The draw soil was a Bigetty silty loam (classified as a fine, silty, mixed thermic Cumulic Haplustoll) while that of the gravelly site was a Monterosa gravelly loam (classified as a loamy-skeletal, mixed thermic, shallow Ustollic Paleorthid). Mean annual precipitation for the area is about 12 inches. Actual precipitation measured at the study area was 14.87 inches in 1984; 19.32 in 1985; 22.96 in 1986; and 9.77 inches from January through July 1987.

Tebuthiuron was applied aerially to approximately 80 acres of draw and 40 acres of gravelly sites at the rate of 1.5 lbs. active ingredient per acre (20% pellets) on April 8, 1984. These sites along with adjacent non-treated control areas of approximately the same size were protected from grazing from 1984 through the summer of 1987. Grass production was determined in September 1986 by clipping to ground level randomly placed 5 ft.^{2} quadrats in each of the treated and untreated areas. Stein's 2-stage method (Steel and Torrie, 1980) was used to determine necessary number of plots - 45 on each treated and 80 on each untreated area. Herbaceous material was oven-dried at 54°C for 24 hours. Brush mortality was determined by counting live and dead plants in 5 ft. by 100 ft. belt transects (9 in each draw area, 6 in each gravelly area). Chi square analysis was applied to brush mortality data while forage production was subject to paired t-test analysis (Little & Hills, 1978). Since treatments were not replicated inferences reported are restricted to the study area.

RESULTS AND DISCUSSION

Mean mortality of brush species in the treated draw site was 10% for mesquite -Chi^2 (1, N = 43) = .95, $\mathbf{p} < .50$; 55% mortality for creosotebush -Chi^2 (1, N = 35) = 12.16, $\mathbf{p} < .001$; and 75% for catclaw mimosa -Chi^2 (1, N = 86) = 27.85, $\mathbf{p} < .001$ (Table 1). Mesquite was apparently resistant to tebuthiuron at the rate applied in the draw site. Tebuthiuron label recommendations are higher for mesquite than for catclaw mimosa or creosotebush, indicating a recognized resistance of that species to the chemical. Higher rates of tebuthiuron are necessary for mesquite in finer textured soils since the herbicide is tied up by clay-sized soil particles and the amount of chemical available to be taken up by the root system is reduced (Herbel et al. 1985).

Mortality rates on the treated gravelly sites were 100% for catclaw mimosa -Chi^2 (1, N = 63) = 49.64 $\mathbf{p} < .001$; and 94% for creosotebush -Chi^2 (1, N = 186) = 170.61 $\mathbf{p} < .001$ (Table 1). A single mesquite (live) was found on the treated gravelly site and none were present on the untreated site (thus statistical comparsion was not possible). Tebuthiuron at 1.5 lbs ai/ac was more effective on catclaw mimosa and creosotebush on the coarse textured gravelly site than on the fine textured draw site.

Authors are Associate Professor and Graduate Student respectively, Range Animal Science Center, Sul Ross State University, Alpine, Texas.

Table 1. Mortality of Mesquite, Catclaw Mimosa and Creosotebush, July 1987, on plots treated with 1.5 lbs/ac tebuthiuron, Brewster County, Texas.

Species	Draw Site Percent Mortality		Gravelly Site Percent Mortality	
	Treated	Untreated	Treated	Untreated
Mesquite	10%	0%	0%	No mesquite
Catclaw mimosa	75%*	0%	100%*	0%
Creosotebush	55%*	0%	94%*	0%

* Mortality level significant at $p < .001$.

Grass production was 133.4 lbs/ac on the untreated draw site compared to 509.4 lbs/ac on the treated draw ($p < .01$). Grass production was 161 lbs/ac on the untreated gravelly site compared to 960 lbs/ac on the treated area ($p < .001$). Forb production was lower on both treated sites ($p < .001$) (Table 2). Grass and forb production were similar on both untreated sites, and the response to treatment was greater on the gravelly site (a 6-fold increase) than on the draw site (a 3.8-fold increase). One would expect more response on the presumably more productive draw site. However, there was a greater abundance of mesquite on the draw site which was relatively resistant to tebuthiuron at the rate applied.

Table 2. Grass and forb production, October 1986, on plots treated with 1.5 lbs ai/ac tebuthiuron, Brewster County, Texas.

Class	Draw Site Pounds/Acre		Gravelly Site Pounds/Acre	
	Treated	Untreated	Treated	Untreated
Grasses	509.4*	133.4*	960.0**	161.0**
Forbs	0.0	11.3**	0.0	11.7**
Total:	509.4*	144.7*	960.0**	173.3**

*Significant difference at $p < .01$ within a site.
**Significant difference at $p < .001$ within a site.

CONCLUSION

Tebuthiuron at 1.5 lbs ai/ac was more effective in eliminating catclaw mimosa and creosotebush than mesquite, and was more effective on the former two species on the gravelly site than on the draw site. The natural lack of mesquite on the gravelly site resulted in a greater response of grasses to control of catclaw mimosa and creosotebush on that site than on the draw site where remaining mesquite apparently continued to depress grass production.

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