

# Effect of Spring Burning on Tobosa Grass<sup>1</sup>

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## Highlight

During a wet year tobosa produced more herbage on burned plots than on unburned plots at five locations. Ash from the burns had a slight fertilizing effect, but removal of litter stimulated production more than any other factor. Based on this data, fire can be used as a tool to control mesquite without harming tobosa.

Since our recent research indicates that fire has the potential to kill mesquite in tobosa (*Hilaria mutica*) communities (Stinson and Wright, 1969), this study was undertaken to see how seriously fire will damage tobosa. Tobosa is a dominant of the Southern Desert Plains of North America (Clements and Shelford, 1939) and is the climax on adobe soils (Campbell, 1931). Moreover, it is a productive grass type (Paulsen and Ares, 1962) that is cherished by southwestern ranchers as a "reserve" feed during dry years. Therefore we do not want

to damage it by burning if fire proves to be a useful tool to control mesquite. The objective of this study was to see if spring burning would damage tobosa.

Since tobosa is a coarse plant that is generally unpalatable and builds up large amounts of litter, several researchers have tried various methods of increasing its palatability and utilization. Heavy grazing, mowing, and burning have all been tried, and have all increased utilization. Mowing, however, is impractical on large areas, and burning has only been tried in late summer (Gonzalez, 1957) when little time was left for regrowth.

## Methods and Procedures

Yields on pure stands of tobosa were measured on five burned and unburned locations in northwest Texas: two near Post, one about 15 miles east of Guthrie, one about 7 miles north of Quanah, and one 15 miles south of Colorado City. In addition a clipped plot, where all growth was removed at time of burn on an associated plot, was sampled at Colorado City.

All plots were burned in late spring from March 23 to 28, 1968. Burning is being concentrated at this time of year for three reasons: (1) ranchers can decide whether they need tobosa as a reserve feed and are willing to burn if they do not need it, (2) an evaluation of adequate soil moisture for plant regrowth can be made, and (3) top removal of the dormant tobosa should be least harmful.

Size of the burned plots varied from 1 to 90 acres and elevation varied from 1602 to 2880 ft. Precipitation averages about 19 inches per year. The vegetation at each location was nearly a pure stand of tobosa grass with a few annual forbs.

Mesquite also existed on all plots. At both locations near Post the mesquite had no prior treatment. At Quanah and Guthrie the mesquite had been shredded 2 to 3 years previously. And at Colorado City the mesquite had been sprayed in 1965 with no apparent kill.

Firelines were graded around the plots that were to be burned. In general the plots to be burned or not burned were chosen at random. But in two burns, this was not possible because of the necessity to place firelines where the plot could be burned safely. At these locations comparable unburned areas were chosen before burning.

Thirty 1 × 2.4 ft quadrats were clipped to sample growth and litter on treated and untreated plots at each location. The vegetation at all locations was clipped after one full growing season in August 1968. All samples were oven dried and weighed.

## Results and Discussion

Yield of tobosa was higher on the burned plots than on the unburned plots at all locations (Table 1). Moreover, undesirable annual forbs which had emerged before the burning treatment were less abundant on burned

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**Table 1.** Yield of herbaceous vegetation on tobosa plots one growing season after treatments (lb/acre, over-dry).

Location	Clipped	Burned	Control	
			Current growth	Litter
<i>Tobosa grass</i>				
Post I		2084 <sup>1</sup>	1244	4754
Post II		2220 <sup>1</sup>	1424	3672
Guthrie		2205 <sup>1</sup>	1332	3228
Quanah		2314 <sup>1</sup>	1893	3308
Colorado City	3100 <sup>2</sup>	3572 <sup>1</sup>	920	4430
<i>Forbs</i> <sup>3</sup>				
Post I		8	48	
Post II		7	21	
Guthrie		39	60	
Quanah		9	30	
Colorado City	49	13	295	

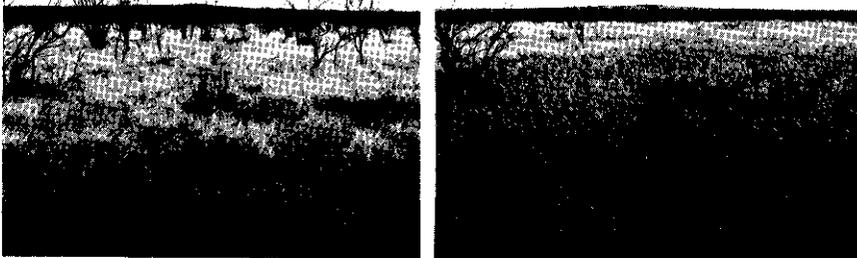
<sup>1</sup>Different from control treatment at .01 level of probability.

<sup>2</sup>Different from burn treatment at .05 level of probability.

<sup>3</sup>The dominant species on unburned plots was *Gutierrezia dracunculoides*; other species present were *Conyza canadensis*, *Erigeron bellidiastrum*, and *Sphaeralcea coccinea*. On burned plots the dominant species were *Chenopodium leptophyllum* and *Solanum elaeagnifolium*.

**Table 2.** Rainfall (inch) for town near burned plots.

Month	Location			
	Colorado City	Quanah	Post	Guthrie
<i>Before burn</i>				
Jan.	1.67	3.37	3.00	3.08
Feb.	1.75	1.02	1.76	1.72
Mar.	1.77	2.25	3.01	2.39
	5.19	6.64	7.77	7.19
<i>After burn</i>				
Apr.	1.37	1.14	.94	.64
May	1.74	3.64	1.87	1.97
June	2.26	2.63	2.05	3.27
	5.37	7.41	4.86	5.88
Total	10.56	14.05	12.63	13.07



**FIG. 1.** View of tobosa grass community at Colorado City before and after burning. Yield of tobosa after burning was 3572 lb/acre and mortality of mesquite was 32%.

**Table 3.** Average maximum temperature (°F) for each burn.

Location	Temperature
Post I	540
Post II	590 <sup>1</sup>
Guthrie	690
Quanah	820
Colorado City	980

<sup>1</sup> Estimate based on a comparable burn.

plots. Clipping increased yields of tobosa almost as much as burning.

The increased yield of tobosa on the burned plot vs. the clipped plot at Colorado City (Table 1) suggests that ash has a slight fertilizing effect. The superior yields, however, of both of these treatments compared with the unburned plots show that large accumulations of litter severely depress production.

Burned plots, except for the one at Colorado City, produced a little over 2000 lbs of tobosa per acre. The one at Colorado City produced 3572 lbs/acre. I do not have an explanation for this difference except that Colorado City has the lowest elevation and is an area where tobosa is very well adapted. This particular site was a bottomland that may be subject to flooding. Total rainfall, however, before the burn and after the burn was lowest in the Colorado City area (Table 2).

Since this was a wet year, we can only say that fire does not damage tobosa during a wet year. Having some moisture in the soil before burning seems to be a sensible requirement before using fire as a tool to control mesquite, if one wants to minimize damage to tobosa.

The range of weather conditions at time of burns were as follows: temperature 65–83 F, wind 6–11 mph, and relative humidity 25–50%. Fuel moisture varied from 13 to 22%. Percent soil moisture in the surface inch varied from 18.1 to 22.8%.

Average maximum soil surface temperatures for each burn are shown in Table 3. Compared to other grass species, tobosa burns hot (Stinson and Wright, 1969). But evidently these high temperatures have no detrimental effect on tobosa, at least when there is moisture in the soil at time of burn.

At Colorado City it looks as if burning can effectively kill mesquite that has been sprayed and has resprouted (Fig. 1). We killed 32% of the trees

and seriously damaged those that were not killed. In our other burns we did not kill any mesquite, some of which had no previous treatment and some of which had been shredded. There were, however, no young plants in any of the burns.

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