

Range, Wildlife and Fisheries Management

**MANAGEMENT OF TOBOSAGRASS
RANGELAND WITH
PRESCRIBED FIRE¹**

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Tobosagrass is a productive, but coarse and generally unpalatable grass. Distribution extends from western Texas through southern New Mexico to southeastern Arizona and north-central Mexico. Tobosagrass typically grows on clayey soil and is commonly associated with honey mesquite. An important characteristic of tobosagrass is perennial stems. These stems and the unpalatable nature of tobosagrass ensure that large quantities of standing dead grass accumulate. As the amount of this dead material increases, new growth decreases until yield stabilizes at 800 to 1,100 pounds per acre.

During the past 20 years a wide variety of fire-related research has been done on mesquite-tobosagrass rangeland. Prudent use of fire in this plant community results in many benefits.

BURNING TOBOSAGRASS RANGE

Tobosagrass range is one of the simplest fuel types to burn due to the non-volatile nature of mesquite and tobosagrass. With the normal accumulation of standing dead grass, 3,000 to 6,000 pounds per acre of continuous grass fuel is available. Therefore, high winds are not necessary to move the fire across a pasture.

A dozed line cut to mineral soil should be placed around the entire area to be burned. A second dozed line is cut at least 100 feet inside the perimeter dozed line on the north and east sides of the area. This 100-foot strip should be burned when the following weather conditions prevail:

- (1) relative humidity between 40 and 60%;
- (2) air temperature between 40 and 60° F; and
- (3) wind speed less than 10 mph.

This creates a fireline that will contain the headfire, to be ignited at a later date. Firelines should be burned between late January and early March.

The main area should be burned in late winter (March) before greenup of tobosagrass. Weather conditions for the headfire should be as follows:

- (1) relative humidity between 25 and 40%;
- (2) air temperature between 70 and 80° F; and
- (3) average wind speed between 8 and 15 mph.

Specific details on conducting prescribed burns can be found in Management Note 9, "Getting started in prescribed burning."



Fire spreading through clump of pricklypear cactus.

BENEFITS OF PRESCRIBED BURNS

Remove Debris

One of the primary uses of fire on mesquite-tobosagrass rangeland is to burn down standing mesquite stems resulting from herbicidal treatments or consume woody debris resulting from mechanical treatments. To effectively burn down dead mesquite stems, relative humidity must be below 40%, wind speed must exceed 8 mph, and grass fuel must exceed 3,000 pounds per acre. Downed mesquite debris can be burned with less fine fuel and lower air temperature than standing mesquite. However, fine fuel must be greater than 1,000 pounds per acre and wind speed must exceed 8 mph. Wind in excess of 8 mph must continue for at least one hour after ignition to ensure consumption of debris or burndown of standing stems. Regardless of whether stems are lying on the ground or standing, larger stems are easier to burn than small stems.

Mesquite Mortality

Mesquite mortality is an added benefit of prescribed burning. Plants less than 3.5 years of age are easily killed by fire. However, when plants reach 3.5 years of age, they are virtually impossible to kill. Large trees that have been top killed by herbicides can be root killed by burning. Trees with basal diameters over 5 inches on upland sites can have initial mortalities over 25% with mortalities increasing for several years depending on drought, insect, and rodent damage. Smaller trees are more difficult to kill. Low growing, shrubby mesquite growing in mottes are virtually impossible to kill. Trees on lowland sites along rivers or on the High Plains are also very difficult to kill.

Cactus Mortality

Cactus species are easily damaged by fire. Mortality of pricklypear cactus is usually low the first year after burning but can increase to over 70% by the end of the third growing season after fire, depending on insect activity.

A higher level of pricklypear control may be desired to eliminate the costly "pearmouth" condition and rumen impaction by pricklypear seeds in sheep and goats. An economical and highly effective method for pricklypear control, involving the sequential application of fire and aerial spraying with picloram, has been developed by the Texas Agricultural Experiment Station at San Angelo.



Prescribed fire plus aerial application of picloram at 0.12 pounds (acid equivalent) per acre reduced live pricklypear cover 98 percent.

The fire/picloram system involves prescribed burning in winter followed by aerial application of picloram at 0.12 pounds (acid equivalent) per acre in a total volume of 3 gallons per acre of a 1:8 diesel fuel-water emulsion carrier during April or May. Live pricklypear cover has been reduced 85 to 91% within 1 year and 94 to 98% within 3 years after treatment on tobosagrass rangeland in western Texas.

Aerial application of 0.12 pounds of picloram costs \$7.00 to \$8.00 per acre. The standard herbicide treatment for pricklypear control in tobosagrass rangeland, aerial application of picloram applied at 0.5 pound per acre, costs \$17.00 to \$18.00 per acre. Thus, the fire/picloram system provides a means for achieving a rapid, high level of pricklypear control at a lower cost.

Cholla cactus is easily killed if less than 2 feet tall. Cholla greater than 2 feet tall may have mortalities of only 25%. Tasajillo cactus are highly susceptible to fire (80% mortality) due to their short stature.

Broomweed Mortality

Common broomweed is killed by burning. During late winter, broomweed is in the rosette stage or is barely starting stem elongation. Burning at this stage kills all the living plants exposed to the fire and consumes the standing dead broomweed stems from the previous year. By the second or third year after burning, broomweed infestations are similar to unburned areas.

Tobosagrass Yields

Burning removes old standing dead tobosagrass, which has a stimulating effect on current year's growth. During years of average or above-average spring precipitation, new growth is 2,000 to 3,500 pounds per acre on burned areas (2 to 3.5

times that of unburned areas). When spring precipitation is below average, new growth will be about 600 to 700 pounds per acre on burned vs. 900 to 1,000 pounds per acre on unburned areas. Therefore, it is important to have adequate soil moisture at the time of the burn.

LIVESTOCK RESPONSE

Livestock perform much better on burned tobosagrass than on unburned tobosagrass. Increases in protein, phosphorus, moisture content, and digestibility result in more rapid forage passage through the digestive tract. New leaves are more nutritious and more palatable, resulting in higher forage intake with a proportional increase in animal performance. A seven-fold increase in utilization of burned tobosagrass has been observed in the spring compared to unburned tobosagrass. During the fall a three-fold greater utilization rate was measured.



Burning pastures during late winter can virtually eliminate annual broomweed for 1 year.

Yearling cattle usually have acceptable daily gains on unburned tobosagrass pastures only during May and June. Even then, in 4 of 8 years in our studies they gained less than 1 pound per day in June. During years with adequate rainfall for significant grass growth in July, daily gains were good. However, relatively dry July periods produced daily gains of less than a pound. August is typically hot and dry and cattle lose weight as frequently as they gain. With milder September and October temperatures, cattle can be expected to gain weight if rain is adequate to provide new plant growth. More commonly, little new growth occurs and animal gain is minimal. During winter, yearling cattle supplemented with 1.5 pounds of cottonseed meal pellets have lost weight on unburned tobosagrass pastures. Winters in western Texas typically are dry and over half the time there is insufficient new growth for grazing in April.



Livestock should be turned on the burned pasture as soon as new growth is tall enough for grazing.

Because burning tobosagrass is recommended only at 5 to 8 year intervals, forage quality becomes poor long before it is time to reburn. To maintain forage quality, under summer-long grazing we suggest a six to eight-pasture rotation so that one pasture can be deferred part of each year for winter burning. For use as seasonal grazing, we find that the currently popular (grazing heavily from May to mid-July, then using the regrowth forage with protein supplement in winter) is the most efficient method for maintaining high quality tobosagrass.

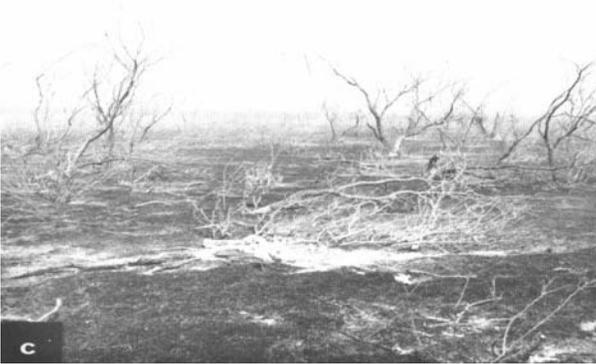


Photo sequence from preburn until 3 months after burning: a) prior to burning the area had 4,070 pounds per acre of tobosagrass fuel; b) 20 minutes after ignition; c) 60 minutes after ignition; d) 1 day after ignition and 85 percent burndown of mesquite stems; e) grasses growing well 1 month after burn; and f) grass yields of 2,800 pounds per acre compared with 1,100 pounds per acre on control.

BURNING INTERVAL

Upland sites should not be burned more frequently than every 8 years and bottomland sites should not be burned more frequently than every 5 years. Soil and plant nitrogen dynamics will be similar to unburned areas by the fifth year on bottomland sites and by the eighth year on upland sites. More frequent burning will result in a long-term decrease in tobosagrass productivity. Resprouts from mesquite top killed by the fire will reach 60% of the height of untreated plants and equal that of sprayed plants by the sixth year.

COVER PHOTO: Burning tobosagrass range in western Texas.

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