

Prescribed Burning

A practice as old as the buffalo trails in the unsettled Great Plains, prescribed burning has waxed and waned in popularity. Time has proven it to be a cost-effective, environmentally friendly means of weed control, water management and pasture rejuvenation.

BY JENNIFER HOTCHKISS



ANGIE STUMP DENTON PHOTOS

No one is sure how it started. Many believe Native Americans of the Great Plains were the first to notice that bison were attracted to grasslands that had been burned in fires started by lightning. After observing this phenomena, the Native Americans figured they could make the bison come to them by burning the grasslands around their reservations, says Clenton Owensby, professor of

range management at Kansas State University (K-State).

In the 1800s, the homesteaders who settled the plains copied the practice, he continues. They, too, discovered that fire not only kept animals within a region, but the cattle looked better and were heavier if they grazed on range that had been burned.

The 1930s brought the practice of burning grasslands to

a temporary halt. Fire suddenly got a bad name, Owensby explains. Droughts prevailed during that time period.

Only a few parts of the country, such as the Flint Hills of Kansas and Osage County of Oklahoma, continued to burn grass, says Terry Bidwell, professor of rangeland ecology and management at Oklahoma State University.

Farmers looked toward

universities for advice on how to manage their grasslands. The university officials encouraged people not to burn grass because it would waste too much water.

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Universities began to promote

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fire as a management tool once again. They recommended prescribed burning — fire used under specific conditions with proper timing.

Prescribed burning continues to be one of the most effective treatments available to improve forage quality today, Owensby says.

According to researchers, the success of prescribed burning depends on the timing. In order to gain the maximum benefits from burning grasslands, the burn should occur at the beginning of the growth of the dominant (bluestems) grasses in your area, Owensby says. To kill off particular weeds, the burning must occur when the weed is in full leaf.

In order to kill the plant, it must be burned when its food reserves are at their lowest. For example, buckbrush, a woody perennial, must be burned in late spring when it is actively growing, Owensby says. On the other hand, smooth sumac, another woody perennial, reaches the lowest point in its food reserves in early June, a

time when burns can't take place because fire would kill the sprouting species of grass.

Fire can be used as a management tool for native grasslands and native hay meadows and in establishing new native grass stands, Owensby says. Burns usually occur regularly in tallgrass prairies or Southeast forest regions, but arid regions are sometimes burned for special purposes.

Native plant communities evolved with fire, Owensby says. Lack of fire usually causes undesirable changes in these plant communities, such as litter accumulation and woody-species invasion. Burning is merely the reimposition of a natural part of the prairie.

"This doesn't mean that all grasslands should be burned regularly like tallgrass prairie," Owensby says. "However, other grasses, like smooth brome pastures, can be burned for special purposes, such as woody-species invasion. Because they begin growth earlier, you burn earlier."

Some of the regions that used to burn naturally are not being burned anymore because people don't want them to burn, Owensby says.

"These regions have faced many negative consequences," Bidwell says. "Because they are not allowing burns to take place, a reduction has occurred in water quantity and quality. It's also diminished habitat for endangered plant and animal species and has reduced forage production for livestock and wildlife."

Grassland maintenance

Fire is an absolute necessity to maintain a healthy environment, Bidwell says. Fire recycles nutrients tied up in old plant growth, controls many woody plants and herbaceous weeds, improves poor grazing distribution, improves wildlife habitat, and increases livestock production in stocker operations.

"Burns simply maintain a grassland," Owensby says. "Without fire, grasslands would turn into a woody complex.

First, the grassland would turn into a juniper-red cedar woodland. Eventually, it would turn into an oak-hickory forest."

The timing of the burn affects the forage yield. If the grass is burned too early, the amount of forage produced will decrease. However, K-State research has shown that there is not a significant difference in forage yield between the late-spring burns and the unburned ranges that are grazed.

The differences in forage yield are a result of moisture and temperature changes. In early-burned areas, soil moisture evaporates at a high rate. Water loss is also due to a reduction in the infiltration rate of water into the soil.

The rate at which water will go into the soil is due to the number of large pores in the soil surface. Early spring rainfall can result in puddling on the soil surface, which may cause water not to be taken into the soil as quickly as on the late-burned or unburned areas.

"If a prairie is burned in early spring, and then rained upon, it's like pouring water onto flour," Owensby says. "The longer the soil remains barren, the greater the soil-water loss."

Owensby says a decrease in soil water equals a decrease in grass yield. If a prairie is burned on March 20, the prairie will have 1,000 pounds (lb.) less production than if it is burned on the last week of April.

Soil temperature rises quickly following a burn, but not because fire affects the soil directly, Owensby says. The fire removes the litter layer, an insulating blanket, from the ground. When this layer is removed, the sun can warm the soil. Plant growth is then much faster in burned areas as compared to unburned areas.

Increased livestock performance

For more than 50 years, Buck

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Burn grasslands safely

The biggest challenge that rancher Buck Gehrt, Manhattan, Kan., faces each year when he burns grass is keeping the fire from moving to unwanted areas. Careful planning weeks or months in advance can minimize these challenges and prevent other dangers.

"Fire is not something to attempt without training," says Clenton Owensby, professor of range management at Kansas State University. "You must have someone teach you or help you with the burn. You need to understand the principles behind it before you begin."

Poorly managed burns or ignorance of safety procedures can lead to building damage and even injury or death. Here are some safety tips to follow.

■ **Healthy workers.** Prescribed burning is a stressful, strenuous activity that requires people who participate in the burn to be in good physical condition and health.

■ **Notify people when you are planning a burn.** Local authorities should be contacted before the burn takes place. Neighbors, fire department and law enforcement officials also must be notified.

■ **Don't allow smoke to endanger the public.** From a public-safety standpoint, smoke should not cross public roads. This could cause a visibility problem for drivers. Smoke also should not interfere with airports. Smoke could cause poor visibility, as well as turbulence and updraft problems for light aircraft.

■ **Burn when the weather is favorable.** Weather conditions must be acceptable before a burn can take place. The wind should be between 5 and 15 mph and steady from a desirable direction. Clouds should not cover more than 70% of the sky. Temperatures



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should not exceed 80° F or be below 55°. When temperatures are greater than 80°, workers tire more quickly and require higher levels of fluid to maintain stamina. When temperatures are less than 55°, people have problems working effectively and may become chilled.

■ **Don't burn at night.** Don't begin burns at night because the darkness prevents workers from being able to find their way, see obstacles, judge distances and assess the overall situation. Night fires also appear more severe and could cause more public alarm. However, a fire that has been brought under control (one in which all the borders have been protected by burning or other means) can continue to burn through the night. On large pastures, a burn started early in the morning may well burn through the night in order to burn the entire pasture. The important thing is to make sure the perimeters are secured against the fire's escape.

■ **Inform all crew members of the master burn plan.** Before the burn, the crews should be briefed on the burning plan. This briefing should include designating who is in charge, the responsibilities of each person during the burn, and the responsibilities of each person if the fire escapes.

■ **Communicate at all times during the burn.**

Communication needs to occur between the people conducting the burn and emergency-assistance stations. Also, communication must exist between the crews working on the burn. Inform the fire authority in your area when you have finished with the burn or have it contained. Then, if an accidental burn should occur nearby, the authorities will respond because they know your area is no longer burning.

Gehrt, Manhattan, Kan., has conducted burns to maintain the thousands of acres of grass around him. Gehrt leases pasture to cattlemen who want to graze their cattle before sending them to the feedlot.

"Yearling steers gain better on grass that has been burned," Gehrt says. "The cattle will go straight to the new grass that has sprouted since burning. They won't eat the old grass that's been around for a year and has lost most of its nutrients."

K-State research backs this claim and shows that stocker cattle will gain 10%-12% more on late-spring-burned pastures than on unburned or early-burned pastures. The weight gain, which is different than the forage yield, occurs because a higher quality of forage is made available in the first half of the grazing season.

The cattle have the same amount of forage to graze, it's just better quality, Owensby says. This increase in nutrients occurs when the soil warms up faster than normal. Microbes work more rapidly in response to the warmer soil and allow a greater availability of nutrients

for plants. These plants help increase gains because they have a higher concentration of crude protein and a decreased concentration of fiber after burning.

"Cattle will typically average 31 pounds more after grazing on late-spring-burned pastures than grazing on unburned pastures," Owensby says. These significant performance benefits occur only during the year in which the burn takes place.

Improved grazing distribution

Fire can be an effective management tool to improve grazing distribution, Owensby says, explaining cattle do not graze evenly. Burning changes the grazing pattern and evens out the grazing distribution.

Areas that usually are not grazed, or are undergrazed, can be burned, Owensby says. Generally, overgrazed areas do not have enough fuel to carry a fire. Cattle are attracted to grasses in the burned areas since they are more accessible and palatable. As a result, overgrazed areas will be used less and can have time to recover.

"If you don't burn grass, then

some areas of the pasture will remain short year after year," Gehrt says. "The cattle will keep coming back to the fresh, short new grass. By burning the tall grass, you allow time for the short grass to grow."

Burning also provides benefits for wildlife. When burns are properly timed, they can increase warm-season grasses and forbs, which improves food supply, nesting and brood-rearing cover for ground-dwelling birds. The removal of litter provides wildlife with greater access to insects, too.

"The wildlife we are accustomed to would not be here if we didn't burn grass," Gehrt says. "Burning maintains the grasslands and prevents it from turning into a forest. If the environment changed, so would the wildlife you are used to seeing in this area."

Gain vs. cost


The costs involved with prescribed burning vary upon the size of the pasture and the quality of the pasture's boundaries. In general, burning is not overly expensive, Owensby says.

"If you have a big pasture with good boundaries, burning could cost as low as 50¢ an acre," he explains. "If you have poor boundaries that will make the fire difficult to keep on your place, it could cost as much as \$4 to \$5 an acre."

Other alternatives to manage grasslands — such as mowing, dozing and herbicides — are more costly. Chemical sprays are effective in controlling weeds and brush, but they are more expensive, Gehrt says. And they would not add to the quality and quantity of grass like prescribed burning, he adds.

"I don't claim to be an authority on prescribed burning," Gehrt says. "But I've lived long enough to know you learn a little something more about it each year."

Even if you never figure out the name of every grass, flower, weed and woody plant on the prairie, you can still be a good manager of grass if you follow two basic rules, Gehrt says. Don't overgraze, and burn the grass each spring.

Gehrt adds, "I know it's hard work to burn grass, but it's a necessity." 

Related Web sites to visit

www.ianr.unl.edu/PUBS/RANGE/ec148.htm—"Grassland Management with Prescribed Fire," Nebraska Cooperative Extension EC 98-148-A.

www.ianr.unl.edu/pubs/range/nf268.htm—"Conducting a Prescribed Burn on Warm-Season Grass CRP Sites," Nebraska Cooperative Extension NF 96-268.

www.cahe.nmsu.edu/pubs/resourcesmag/hotstuff/fall98.html—"Prescribed burning not always the cure," *New Mexico Resources*, New Mexico State University.

texnat.tamu.edu/ranchref/guide/rwabc.htm—"Rangeland Weed and Brush Control," Reference Guide for Texas Ranchers.

texnat.tamu.edu/symp/juniper/BRITT.htm—"Juniper Burning at Texas Tech," contribution No. T-9-772, College of Agricultural Sciences and Natural Resources, Texas Tech University.

ncsl.org/programs/esnr/presburn.htm—"Private Landowners' Liability for Prescribed Burns," National Conference of State Legislatures Web site.