THE RESPONSE OF BUNCHGRASSES TO PRESCRIBED BURNING IN MOUNTAIN BIG SAGEBRUSH PLANT COMMUNITIES

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As the cost of both mechanical and chemical treatments continues to rise and public sentiment against use of herbicides increases, interest in prescribed burning also is increasing. Unfortunately, many land managers and property owners hesitate to use prescribed burning because fire is often viewed as a destructive force, not as a tool for management. Information concerning the effect of fire on perennial bunchgrasses and associated species often is considered inadequate for ecologically sound fire prescriptions.

This study provides additional insight into some impacts of prescribed burning on mountain big sagebrush *(Artemisia tridentata* subsp. *vaseyana* communities. Mountain big sagebrush is the most mesic subspecies of big sagebrush, and, therefore, bunchgrasses associated with it are relatively mesic species or ecotypes in comparison to bunchgrasses associated with Wyoming or basin big sagebrush *(Artemisia tridentata* subsp. *wyomingensis* and *tridentata*, respectively). Several researchers have stressed the importance of differences in ecological potential associated with sites supporting different subspecies of big sagebrush. Thus, the results of this study must be interpreted in the context of mountain big sagebrush communities.

STUDY AREAS

This study was conducted at two locations. The first study area was on the Lava Beds National Monument, 26 miles southeast of Klamath Falls, Oregon, where the mean annual temperature and precipitation are 48 degrees Fahrenheit and 14.3 inches, respectively. The site was on a broken monocline at an elevation of 4,440 feet. The second study area was on the Crooked River National Grassland, 13 miles northwest of Prineville, Oregon, where the mean annual temperature and precipitation were 45 degrees Fahrenheit and 13.7 inches, respectively. This site was on the northwest aspect of a steep ridge at an elevation of 3,360 feet. The upper 7.9 inches of soil at Crooked River primarily were composed of tuffaceous gravel less than 1 inch in diameter with little soil between the coarse fragments.

METHODS

Production data were obtained from 26 quadrats on each site each year of the study. Years were used as treatments to analyze productivity of bluebunch wheatgrass *(Agropyron spicatum)* and Thurber needlegrass *(Stipa thurberiana)* on each site studied.

The prescribed fire on the two areas differed greatly. The Lava Beds fire was a late spring burn, two days after 0.5 inch of rain. Temperature and relative humidity ranged from 63 to 75 degrees Fahrenheit and 25 to 50 percent, respectively, during the burn. The Crooked River burn was a fall burn. Four days before the fire, the area had received 0.4 inch of rain. Temperature and relative humidity ranged from 73 to 75 degrees Fahrenheit and 30 to 33 percent, respectively, during the burn. Shrub canopy cover, and, therefore, shrub fuel loading were similar at both sites. Strip head fires were used to ignite each area. Flame lengths were three times greater and rate of fire spread 10 times greater at Crooked River, resulting in a fire intensity much greater in comparison to the Lava Beds fire.

RESULTS

Sagebrush cover was reduced to less than one percent on all sites studied. One year after the fire (1977), there was no significant decrease in production of bluebunch wheatgrass on any of the three Lava Beds sites (Table 1). However, there was a significant reduction of this species on the Crooked River site. Thurber needlegrass was not present on the Crooked River site; consequently, no evaluation of fire prescription could be made with this species. However, Thurber needlegrass did show a slight decrease on the Hill Top site which was the most xeric site at the Lava Beds.

Table 1. Production (grams/per square meter) of two bunchgrasses before and after prescribed burning on mountain big sagebrush sites.

	Lava Beds			Crooked River
Year	North Slope *Artrv/Feid*	Swale *Artrv/Agsp-Stth*	Hill Top *Artrv/Agsp-Stth*	*Artrv/Agsp*
	Bluebunch Wheatgrass Production			
1976 (before)	12.7	11.5	26.9	21.1
1977	20.4	6.6	35.4	0.04
1978	53.8	67.6	30.8	35.8
	Thurber Needlegrass Production			
1976 (before)	4.6	20.4	14.6	-
1977	5.4	28.5	6.0	-
1978	14.2	12.0	14.7	-

Changes in grass cover two years after the fire appeared to be related to site features as well as fire intensity. The driest site at the Lava Beds (Hill Top) showed no response. Production on the North Slope and the Swale sites at Lava Beds and the Crooked River site showed a considerable increase in production. Thurber needlegrass remained near prefire levels except on the Swale site where it showed a slight drop in production, perhaps at the expense of increase in bluebunch wheatgrass.

It is generally believed that burning associated with a subsequent droughty period can be especially damaging to bunchgrasses. The timing of the two fires in relation to the drought conditions of 1977 may have influenced the recovery of bluebunch wheatgrass at the two sites. At Lava Beds, the heavy 3.1 inch August rain occurred less than one month after the fire; at Crooked River, the drought followed immediately after the fire. In addition, Lava Beds received 61 percent of its normal precipitation between September 1976 and June 1977 while Crooked River received only 41 percent of its normal precipitation during this period. This combination of factors cannot be ignored when evaluating the effects of these two fires on bunchgrasses. However, edaphic and fire related factors appeared to be overriding influences in the Crooked River fire.

Careful evaluation of this area after the fire indicated that because of the steep slope, the soils had fallen away from the down hill side of each grass clump. This directly exposed some of the roots to the fire. Burned cavities up to 2 inches into the root zone were observed. The gravelly soil also had greater porosity which facilitated movement of hot air and water vapor into the root and bud zone. These features along with season of fire appeared to have been responsible for the first year damage to bluebunch wheatgrass plants. However, the amount of input attributable to each cannot be ascertained from this study.

On sites similar to those at Lava Beds, late spring burning appears to be a good method for controlling mountain big sagebrush with minimal damage to bunchgrasses. Since little detrimental impact occurred on either bunchgrass at the Lava Beds, it was felt the fire prescription had been satisfactory for these sites. On steep areas where the root crown of bunchgrasses is exposed to the flames, burning for sagebrush control may not be feasible.

EFFECT OF HARVEST DATE ON FIVE BUNCHGRASSES OF EASTERN OREGON

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One of the basic problems of range management is when to graze the range. Plants grazed during early growth have difficulty in maintaining a productive growth status since removal of leaves interferes with development of an adequate root system. This early growth phase of shoot and root growth usually is completed by early May in eastern Oregon. What happens to the various grasses after this early growth phase is also an important factor because this is the normal period of harvest by grazing.

A study was initiated to investigate the effects of harvesting range grasses during the normal period of grazing. Objectives of this research were to evaluate different harvest dates with respect to subsequent changes in basal area of the grass plants and the resultant changes in yield.