

RESPONSE OF UNDERSTORY VEGETATION IN MOUNTAIN BIG
SAGEBRUSH HABITAT TYPES AFTER SPRAY RELEASE

R. F. Miller, R. R. Findley, and J. Alderfer-Findley

The need for plant response data in chemical control programs on rangelands has intensified because of an increase in users of this resource. Land managers must be able to predict accurately the outcome of brush control programs. Researchers have reported numerous examples of increases in forage production and beef production after chemical control of sagebrush (*Artemisia tridentata*). Information also is available on changes in plant composition after brush control with 2,4-D (2,4-dichlorophenoxy acetic acid).

Although numerous publications have dealt with the effects of spraying big sagebrush, the specific subspecies being evaluated rarely was identified. Taxa of *Artemisia tridentata* not only vary morphologically and phenologically but also have distinct ecologic and hydrologic requirements.

The purpose of this study was to document changes in forage production and plant species abundance after application of 2,4-D in the following three habitat types: mountain big sagebrush-Idaho fescue (*Artemisia tridentata* subsp. *vaseyana*/*Festuca idahoensis*), mountain big sagebrush/bluebunch wheatgrass (*Artemisia tridentata* subsp. *vaseyana*/*Agropyron spicatum*), and mountain big sagebrush/Idaho fescue-bluebunch wheatgrass (*Artemisia tridentata* subsp. *vaseyana*/*Festuca idahoensis*-*Agropyron spicatum*).

EXPERIMENTAL PROCEDURES

The study area was on a ranch in eastern Oregon, approximately 9 miles southwest of the town of Ironside. Topography is steep with elevations varying from 6,000 to 7,800 feet. Vegetation on the upper slopes is dominated by mountain big sagebrush, with Idaho fescue on the north-facing slopes and bluebunch wheatgrass on the south-facing slopes. Both grasses were commonly associated together on the northwestern slopes.

In 1974, the area was sprayed with 2 pounds per acre of 2,4-D butyl ester in water by helicopter during the last week of May. No flagmen were used and alternate spray strip patterns resulted. The three sites were selected on the basis of their homogeneity and the presence of adjacent sprayed and non-sprayed strips. Density data for forbs and grasses were recorded in 1977 for each species. Nine randomly selected line transects on the contour of the slope were used to measure shrub cover in each stand. Ninety circular quadrats in each stand were sampled for production in 1977 and 1978 by the ocular weight estimate method.

RESULTS AND DISCUSSION

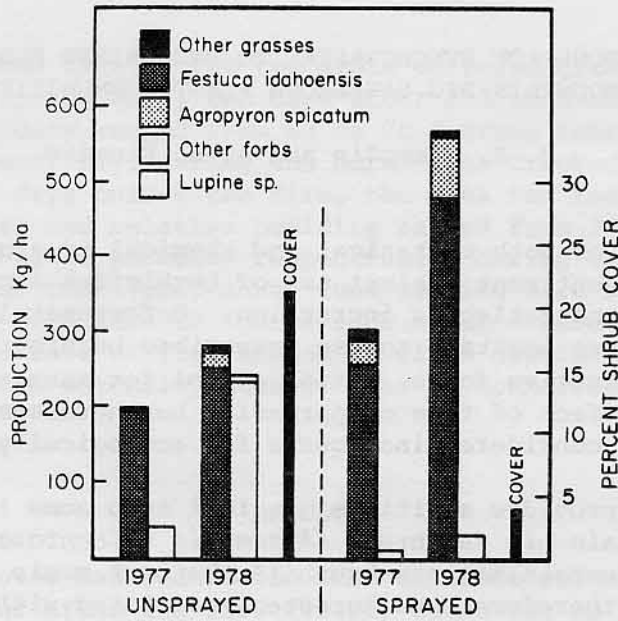
Chemical control of mountain big sagebrush reduced canopy cover 81, 97, and 95 percent in the mountain big sagebrush/Idaho fescue, mountain big sagebrush/bluebunch wheatgrass and mountain big sagebrush/Idaho fescue-bluebunch wheatgrass habitat types, respectively (Figures 1, 2, and 3). Chemical control of sagebrush reported in other studies range from 80 to 100 percent kill. The lowest kill of sagebrush in this study occurred on the mountain big sagebrush/Idaho fescue site where soils were shallow and rocky.

On the two sites with deeper soils, reductions in sagebrush canopy were 15 percent higher. These responses may indicate that percent reduction of sagebrush after chemical control is more a function of the site than subspecies.

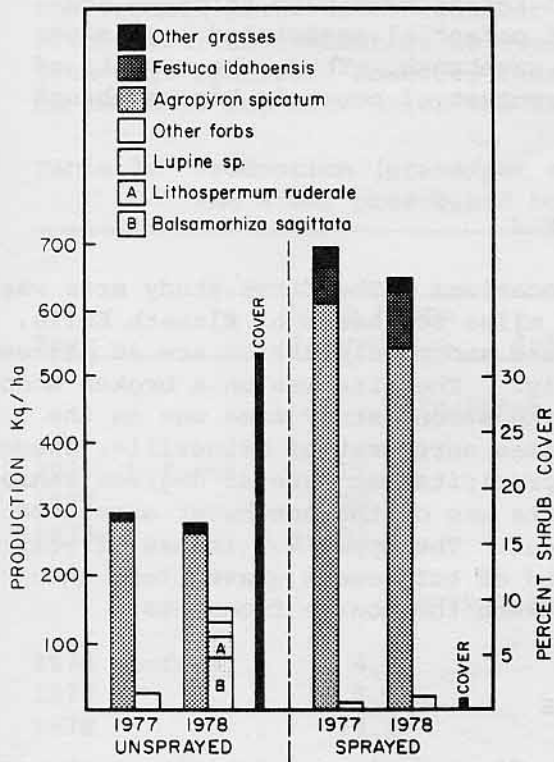
Increases in perennial grass production on all three treated sites averaged 280 pounds per acre excluding 1977 production on the mountain big sagebrush/Idaho fescue site (Figures 1, 2, and 3). This was the only site where perennial grass production was affected significantly by the low levels of precipitation during 1977. A possible reason for the significant response between years on the mountain big sagebrush/Idaho fescue stand was because of the shallow soil. Although total precipitation was 47 percent of normal, above average moisture occurred in May. This apparently reduced drought effects on forage species on the two deep soil sites. Soil moisture storing capacity was low on the mountain big sagebrush/Idaho fescue site so continual replenishment of soil moisture throughout the 1978 spring greatly enhanced forage production.

On these sites, existing levels of perennial grasses in the non-sprayed stands appeared to be adequate for spray-release ranging from 180 to 270 pounds per acre. On all three habitat types the source of increased forage production was caused partially by an increase in newly established plants. However, a substantial increase in plant height and plant diameter was observed.

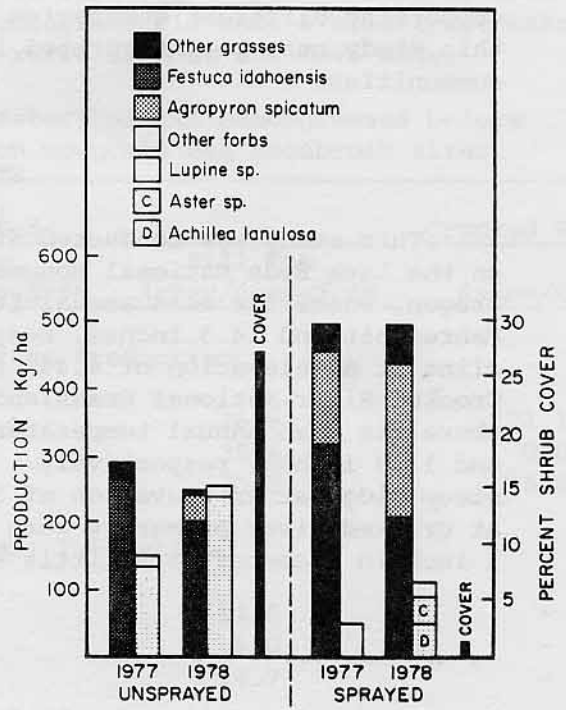
Forbs made up a relatively small proportion of the total herbaceous production across all three habitat types. This may be attributed to either site factors or heavy sheep grazing before 1963. Forb production and, in some cases, density tended to be depressed after chemical control. Forbs most affected by the application of 2,4-D were lupine (*Lupinus* sp.) and arrowleaf balsamroot (*Balsamorhiza sagittata*). Forbs that increased after chemical control were western yarrow (*Achillea lanulosa*) and leafy bract aster (*Aster foliaceus*). Application of 2,4-D appeared to have little effect on many of the other forbs, however, because of their low numbers, these plants were inadequately sampled. Also, time of sampling occurred after peak production of most forbs.



1



2



3

Figures 1, 2, and 3. Grass and forb production and percent shrub cover on unsprayed and sprayed; 1. *Artemisia tridentata* subsp. *vaseyana*/*Festuca idahoensis* habitat type; 2. *Artemisia tridentata* subsp. *vaseyana*/*Agropyron spicatum* habitat type and 3. *Artemisia tridentata* subsp. *vaseyana*/*Festuca idahoensis*-*Agropyron spicatum* habitat type in 1977 and 1978.