

EFFECTS OF TEBUTHIURON ON A
WESTERN JUNIPER COMMUNITY^{1/}

C. M. Britton and F. A. Sneva

Western juniper (*Juniperus occidentalis*) occupies some 1.8 million acres of rangeland in eastern Oregon. Distribution extends east of the Cascades through eastern Oregon and includes small areas in southern Washington, southwestern Idaho, northwestern Nevada, and northeastern California.

Little information is available on the ecology or control of western juniper. Invasion of western juniper into sagebrush-bunchgrass communities apparently started about 1860 when the juniper expanded its sphere of influence beyond the climax position on rocky ridges and rimrocks onto the deeper soils of valley slopes and bottoms.

Many control techniques have been tried on juniper with varying degrees of success. Most of the commonly used herbicides have been tested with soil applied formulations giving good results on some southern junipers. Prescribed burning has been found effective in some areas although closed stands of western juniper are difficult to burn.

The objectives of this study were to evaluate the effects of the relatively new herbicide, Tebuthiuron, on a western juniper community. Evaluations were made on both aerial and individual tree applications.

EXPERIMENTAL PROCEDURES

The study area was located at the Squaw Butte Range unit. Tree layer vegetation consisted of western juniper with a density of about 50 trees per acre. Shrub vegetation was comprised of low sagebrush with lesser amounts of green rabbitbrush and occasional clumps of big sagebrush. Grass vegetation was primarily Sandberg bluegrass, Idaho fescue, squirreltail, bluebunch wheatgrass, and Thurber needlegrass. A wide variety of forbs is present but make up less than 10 percent of the herbaceous production.

Tebuthiuron (20 percent active ingredient pellets) was aerially applied to five-acre plots during late October 1975 at rates of 2 and 4 pounds active ingredient/acre. In early April 1976, adjacent to the aerial application plots, Tebuthiuron was applied to 160 trees at rates of 0, 10, 20, and 40 grams active ingredient/tree. Trees were separated into two size classes, large (greater than 6 feet tall) and small (less than 6 feet tall). Mortality data were from counts of marked trees. Herbaceous production and frequency measurements were made during June.

^{1/} This paper reports the results of research only. Mention of a pesticide in this paper does not constitute a recommendation by USDA nor does it imply registration under FIFRA.

RESULTS AND DISCUSSION

Aerial application of Tebuthiuron was not affective in killing western juniper at the rates applied (Table 1). Although most marked trees showed appreciable crown scorch, only 22 percent were killed by the 4 pounds/acre rate.

Table 1. Percent mortality of western juniper in eastern Oregon treated with aerial application of Tebuthiuron

Rate (lb/ac)	Mortality percent
0	0
2	1
4	22

Tebuthiuron did cause appreciable mortality of the herbaceous vegetation (Figure 1). In 1976, one growing season after herbicide application, the 2 pounds/acre plots were producing 62 percent and the 4 pounds/acre plots only 42 percent of the control plot yield. Two years later, in 1978, the herbicide effects were more pronounced. Compared to the average control plot yield, the plots treated with 2 pounds/acre produced about 6 percent and the 4 pounds/acre plots slightly more than 1 percent of control plot yield.

The growing season of 1976 was characterized by dry conditions with about 90 percent of average crop year precipitation. In 1977, drought conditions existed; only 60 percent of average crop year precipitation was recorded. Above average precipitation fell in 1978, approximately 130 percent. These variations in moisture conditions probably had an effect on vegetative response to Tebuthiuron. The dry conditions of 1976 and 1977 probably had a negative effect on herbaceous vegetation weakened by the herbicide. Other research does not reflect these strong negative effects at these rates of Tebuthiuron.

All grasses were damaged by the herbicide treatments although Idaho fescue appears more tolerant than most. Low sagebrush and big sagebrush were severely damaged even at the low rate. Green rabbitbrush, a plant that is resistant to control measures, was damaged by the aerial application of Tebuthiuron. The 2 pounds/acre rate was moderately effective and the 4 pounds/acre rate virtually eliminated green rabbitbrush. Forbs generally followed the same pattern of severe damage seen for grasses and shrubs except biscuitroot and lupine species.

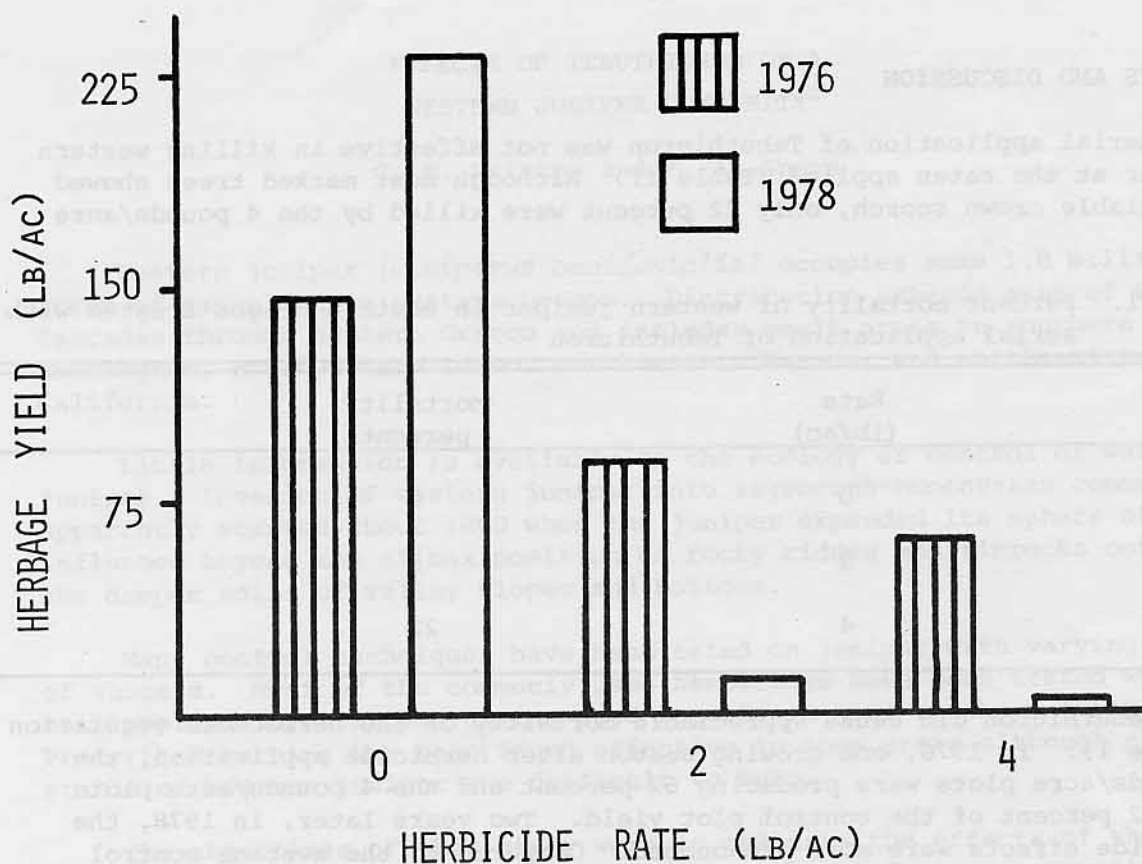


Figure 1. Average herbage yield for plots treated with different rates of Tebuthiuron for 1976 and 1978.

The application of Tebuthiuron to individual trees was considerably more successful than aerial application (Table 2). Young trees (less than 6 feet height) were highly susceptible to the 20 and 40 gram/tree rates. These rates were not significantly different and killed more than 80 percent of the smaller trees. Trees less than 6 feet tall generally are less than 50 years old.

Table 2. Percent mortality of western juniper in eastern Oregon treated individually with Tebuthiuron

Tree size class	Herbicide rate (g/tree)			
	0	10	20	40
Over 6 feet	0	0	5	10
Under 6 feet	0	45	80	85

The herbicide was applied to individual trees in both pellet and bolus preparations. There was no significant difference in mortality. However, a more consistent and higher intensity of crown damage did result from the pellets.

Aerial application of Tebuthiuron pellets does not appear a practical management technique on areas where significant quantities of grasses and forbs are found. In closed stands of juniper where most control techniques are too expensive, too hazardous, or both, Tebuthiuron at rates greater than 4 pounds active ingredient/acre might provide an excellent control technique although the soil sterilant effect may be present for longer than 2 years. Control of individual small trees can be effectively accomplished with application of either 20 or 40 grams active ingredient/tree. In many areas where small invading trees may become a future problem, Tebuthiuron can be used for effective control.