GRAZING AS AN ALTERNATIVE SILVICULTURAL PRACTICE

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One important factor restricting reforestation of many forestlands is the failure of tree seedlings to survive on sites characterized by rapid establishment of shrub and herbaceous vegetation. Because of accelerated juvenile growth rates exhibited by many of these species, resources are quickly made less available for tree growth.

In southwest Oregon, reforestation has been particularly difficult because of the combined effects of competitive understory vegetation and dry climatic conditions. In the past, silvicultural prescriptions have strongly emphasized the use of herbicides to control competing vegetation. However, recent court decisions banning the use of herbicides on federal properties have forced foresters to consider alternative vegetation management approaches. Methods such as hand slashing and paper-mulching are being considered as alternatives to herbicides. These techniques are often expensive in comparison to herbicides.

One management approach which may effectively promote forest regeneration is the incorporation of controlled cattle grazing with intensive forest management. We are developing a research program in southwest Oregon which has as its primary goal the assessment of cattle grazing as a means to promote establishment of conifer seedlings. It is assumed that controlled grazing will reduce competing vegetation and increase the availability of soil moisture and nutrients for tree growth. If livestock grazing increases growth and survival of conifer seedlings, then this research will provide a basis for improvement of both grazing and forest management systems.

METHODS

The study area is approximately eight miles northeast of Butte Falls, Oregon, on land administered by the Medford District of the Bureau of Land Management. The forest community in the area is mixed conifer with Douglas-fir being dominant. Elevation of the study area is 3,000 feet, with slope gradients ranging from 5 to 25 percent. Average annual precipitation is 35 inches, and average seasonal temperatures range from 30° F in January to 64° F in July.

Experimentation was carried out on two adjacent sites. The first was a 26-acre unsuccessful ponderosa pine plantation. Severe soil compaction caused by logging practices and improper establishment of pine had significantly reduced wood production of this site. Site preparation in 1984 involved scarification and piling of pine by bulldozing, followed by ripping of the soil to reduce soil compaction. Piles were burned in the fall.

The second site was a 24-acre mixed-conifer forest community tractor-logged in 1984 using designated skid trails. Slash on the site was burned during fall 1984.

Research was designed to examine tree growth response as influenced by cattle grazing on sites allowed to revegetate naturally after site preparation, and on sites seeded with palatable forage species. Appropriate treatments were seeded in fall 1984. Because of poor winter growing conditions, sites were reseeded in March 1985. Pastures were seeded with a mix of perennial ryegrass, orchard grass, white clover, and subterranean clover. Douglas-fir and ponderosa pine seedlings (2-0) were planted (5:1 ratio) during the spring of 1985. A 6 x 6 planting density (approximately 1,000 trees/acre) was used.

The following treatments were applied to both sites:

Treatment 1

After initial site preparation and tree planting, this treatment was managed according to silvicultural prescriptions. No grazing occurred on this treatment.

Treatment 2

After site preparation, native vegetation was allowed to establish on the site. This treatment received livestock grazing.

Treatment 3

This treatment compared ungrazed seeded forages with tree growth response. This treatment was designed to assess conifer survival and growth under maximum competition from forage species.

Treatment 4

This treatment was similar to Treatment 3, but included livestock grazing. A carefully controlled grazing management program was employed to achieve proper utilization of forage species and minimize browsing of Douglas-fir seedlings.

Both units were grazed during the first week of June 1985. Treatment 2 of the burned unit was not grazed because of lack of forage. Vegetation regrowth of seeded forages on the burned unit was sufficient to warrant regrazing during the second week of June. At the time of grazing, forages were in vegetation stages of growth (i.e., high palatability) and Douglas-fir seedlings were initiating current year's growth.

Information recorded after the grazing treatments centered around impacts to Douglas-fir seedlings. This included:

1. Browsing of terminal and lateral branches before and after grazing.

2. Trampling before and after grazing. Trampling effects were classified as superficial (surface scarring) or cambial (deep scarring).

3. Water stress of seedling throughout the growing season using pressure chamber techniques.

RESULTS AND DISCUSSION

Browsing and Trampling

Browsing and tramping of Douglas-fir seedlings before and after cattle grazing are summarized in Tables 1 and 2, respectively. Data presented for "before grazing" is a reflection of browsing and trampling attributed to wildlife. The "after grazing" values indicated impacts resulting from cattle grazing on the site.

Overall, wildlife appeared to browse Douglas-fir seedlings to a greater extent than did cattle. This relationship was particularly evident on both units when comparing percent lateral browsing for the before and after grazing periods. Higher browsing percentages found on the burn unit in comparison to the scarified unit for the "after grazing" period were most likely the result of the two grazing periods.

In contrast to browsing, cattle appeared to inflict a greater degree of trampling on Douglas-fir seedlings than did wildlife. Again, the higher values on the burn unit in comparison to the scarified unit were probably a reflection of the longer grazing period on this site.

Water Relations of Douglas-fir

Pre-dawn water relations values during the course of the growing season for the burn and scarified units are presented in Figures 1 and 2, respectively. Water stress of Douglas-fir seedlings did not significantly differ between treatments in both the burned and scarified units. Seedlings on the burned unit exhibited low water stress as values did not exceed -1.5 MPa (-15 bars) during the growing season. Seedlings on the scarified unit exhibited greater water stress than seedlings on the burn unit, but only exceeded the -1.5 MPa value during the August 8, 1985, reading.

CONCLUSIONS

Cattle appeared to have a greater tendency to trample seedlings and wildlife appeared to have a greater propensity towards browsing of seedlings. Overall levels of browsing and trampling were relatively low when considering the number of trees planted on a per acre basis. Water stress levels during the first year did not appear to limit growth and survival of Douglas-fir seedlings on this site. First year results indicated cattle grazing may be an effective silvicultural tool in establishment of conifer plantations. How browsing, trampling, and water stress affect long-term growth and survival of Douglas-fir seedlings will be evaluated in future research.

Table 1. Percent Browsing of Lateral Shoots of Douglas-fir Seedlings on Burned and Scarified Units

	Burn Unit		Scarified Unit	
	% Terminals	% Laterals	% Terminals	% Laterals
Before Grazing	1.8	14.3	1.3	15.0
After Grazing	5.3	4.6	.5	.9

Table 2. Percent Superficial and Cambial Trampling of Douglas-fir Seedlings on Burned and Scarified Units

	Burn Unit		Scarified Unit	
	% Superficial	% Cambial	% Superficial	% Cambial
Before Grazing	.3	.1	-0-	.8
After Grazing	10.8	7.2	4.4	4.6