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SEEDING FOREST RANGES

IN THE DRY BELT OF BRITISH COLUMBIA

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Seeding grass on forest land bared by logging or fire prevents soil erosion, increases yields of forage, prevents invasion by weeds, leads cattle into unused portions of range and provides food and cover for wildlife.

Points to Remember in Seeding

1. Seed logged areas with a hand-operated spreader at 6 to 8 pounds per acre. The total cost is about \$4 per acre.
2. Seed large forest burns by air. The total cost is about \$1.50 per acre.
3. Seed only where the soil has been scarified, preferably in the year of the disturbance.
4. Seed summer-logged areas in the fall, and winter-logged areas in the spring if they are accessible.
5. Use a mixture of timothy, orchardgrass, smooth brome grass, Kentucky bluegrass, and white Dutch clover on Douglas fir and damper sites.
6. Use a mixture of crested wheatgrass, Manchar brome grass, white sweet clover, Russian wild ryegrass, and Ladak alfalfa on yellow pine and drier sites.

SEEDING FOREST RANGES IN THE DRY BELT OF BRITISH COLUMBIA

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The forest ranges of British Columbia are multiple-use lands, the harvest including beef as well as trees. Seeding the disturbed areas to grass protects the soil and improves the grazing. The forest zones best adapted to seeding are the Douglas fir, the yellow pine, and, to a limited extent, the spruce-fir. In the Kamloops Forest District, logging disturbs about 170,000 acres each year; much of this land is suitable for seeding.

Most of the grazing area of the province is in the Kamloops Forest District (Figure 1). In this area, more than 1,200 livestock permittees share the crown land with timber companies. They range about 110,000 cattle, 20,000 sheep, and 3,000 horses. The area is also used as a watershed and as a recreational region for sportsmen and holiday seekers.



Figure 1.—The Kamloops Forest District comprises 21 million acres, 11.3 million of which provide forest grazing.

These lands must be managed according to the concept of multiple land-use, which ensures the optimum long-term production of each product. Any practice that is applied to such land may affect all the other uses, not just the one with which it is directly concerned. For example, removing the timber affects the kinds of plants that will repopulate the area. This in turn affects the numbers and kinds of animals, both wild and domestic, that will inhabit the site.

REASONS FOR SEEDING

After a typical logging operation, much land is ready for seeding. The logs are skidded with crawler tractors to temporary mill sites, where they are sawn into log lengths and turned into rough lumber by portable mills. The operation usually covers a total of 500 acres of forest and may take two years to complete. In the fall or at the end of the operation the huge piles of sawdust and slabs at each mill site are burned and the area is abandoned. Left behind are about two miles of main haul road, ten miles of skid trails, and at least six mill sites. About ten percent of the land, therefore, is scarified and is ready for seeding. If it is on livestock range it is profitable to seed it.

If the area is not seeded, many unpalatable weeds, such as thistles, may take over quickly. The bare topsoil may soon be washed away. The access roads, which would have been used by loggers or sportsmen, become gulleyed and impassable.

If the area is seeded, it can provide much palatable forage, and livestock can graze on previously unused sections of the range. Seeding may also help in forest regrowth by reducing overdense stands of conifer seedlings.

WHEN TO SEED

Seed in the same year as the land is disturbed. If you delay, the seedbed becomes hard, the soil erodes, and undesirable plants take hold.

Preferably seed before September so that the seedlings can become established before severe frost. If you cannot seed in early fall, wait until just before snowfall. Seedings have been successful on snow, but it is hard then to see scarified areas and seed may be wasted. Fall seedings usually let the plants get the best start before the next grazing season. It is rarely practical to protect the area from livestock for even one grazing season.

Early-spring seeding, practiced mainly on winter-logged areas, usually ensures good establishment. But soft ground may prevent access to the area.

SEEDING LOGGED AREAS

Seeding a forest range is a large-scale operation and must be done while conditions are suitable. Groups of ranchers who use the same area under one livestock association often cooperate in the seeding. Six men with two vehicles for transportation and for bulk distribution of the seed can easily spread 500 pounds with hand seeders in five to six hours.

Use one of the following mixtures, according to moisture conditions:

Sites with adequate moisture	Percent by weight	Dry sites	Percent by weight
Manchar bromegrass ¹	18	Crested wheatgrass.....	45
Orchardgrass.....	38	Manchar bromegrass.....	25
Timothy.....	38	Russian wild rye.....	10
Kentucky bluegrass.....	2	White sweet clover.....	10
White Dutch clover.....	4	Ladak alfalfa.....	10

How to Seed

Seeding is easy. Along roads, simply broadcast the seed from a spreader mounted on a vehicle with a four-wheel drive (Figure 2). On less accessible or rough areas, walk and spread the seed with a hand-operated Cyclone seeder.

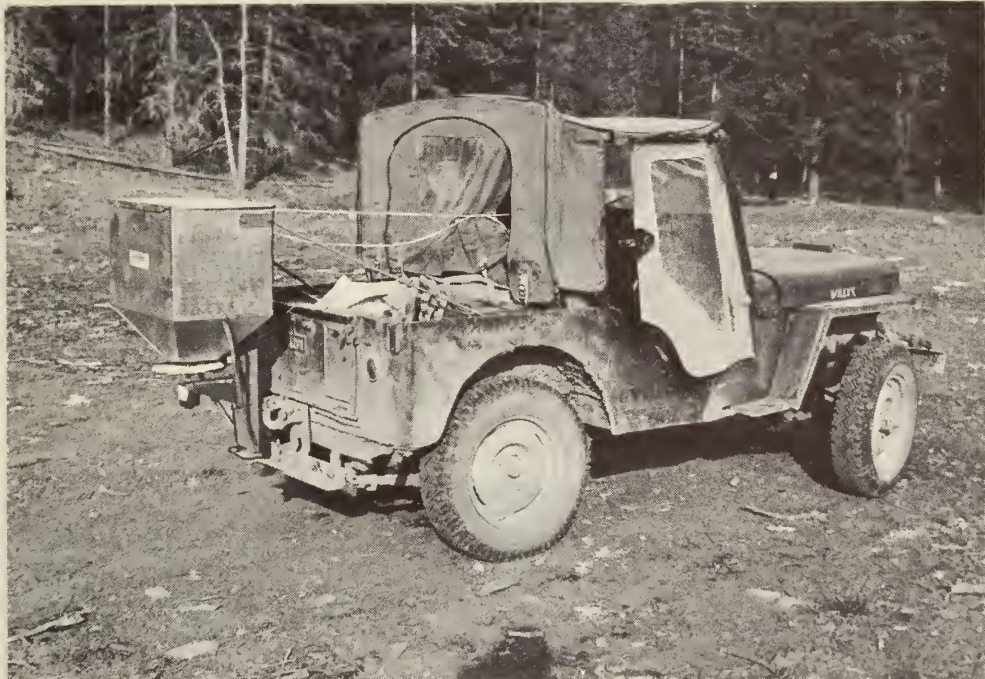


Figure 2.—Cyclone type of seeder mounted on a vehicle with a four-wheel drive. Note the control cords extending into the cab. The seeder is run from a battery and is ideal for seeding logging roads.

Seed at 6 to 8 pounds per acre on moist sites and at 4 to 6 pounds on drier ones. Any higher rate is wasteful. A Cyclone seeder covers about one acre for each 1,200 paces, or five eighths of a mile.

Sow seed only where the vegetation has been destroyed and the soil is bare. Areas logged during winter are seldom scarified as much as those logged in summer, because of the frozen ground and the cushioning effect of snow. As a result, seeding is not so successful on winter-logged areas as on those logged in summer.

¹ The characteristics of some common species are described in the appendix; those for dry sites appear in the companion publication "Reseeding Grassland Ranges in the Interior of British Columbia," Canada Department of Agriculture Publication 1108.

Because it is hard to judge the rate of seeding, you will probably overseed at first. The number of seeds per pound (appendix) shows that the lower rates allow enough seed for a good stand. For example, at 6 pounds per acre the first of the above mixtures gives about 108 seeds per square foot.

SEEDING BURNED AREAS

On burned-over areas a seedbed is created by the fire that has destroyed the ground cover.

Because most burns are extensive and the need to revegetate the area is urgent, aircraft are indispensable in carrying out this type of seeding. Their versatility, low cost per acre, and successful results have been shown in tests on several burns in the southern interior.

The annual reports of the British Columbia Forest Service show that an average of 43,987 acres of the Kamloops Forest District was destroyed by fire annually from 1951 to 1960. The lowest loss, 1,864 acres, was recorded in 1954 and the highest, 105,618 acres, in 1951. When the areas are on forest rangeland and are large enough to justify the use of aircraft, they should be seeded.

Of the several aerial seedings carried out by the B.C. Forest Service in cooperation with the Kamloops experimental farm, most have been done with a bush-type aircraft, either on floats (Figure 3) or on wheels.

The seed is dumped into a hopper fitted with a gate and a venturi spout that extends through a hatch in the fuselage. The gate is calibrated to spread seed at 4 pounds per acre in a swath 150 feet wide while the plane is flying



Figure 3.—A float plane rigged for seeding. This aircraft can carry 1,000 pounds of seed. Note the seeding spout protruding from the center of the fuselage.

about 80 miles an hour at 200 to 400 feet above the ground. Two ground parties carrying large flags can help to direct the aircraft. They walk parallel to one another, 150 feet apart for each swath. If a ground party is used, radio-phone communication must be available to all participants.

A helicopter was used in some tests. It was equipped with seed hoppers and a Cyclone-like spreader operated by electric motors. This machine flew as low as 100 feet from the ground at 50 miles an hour. It carried 250 pounds of seed and spread this in a 75-foot swath in 8 minutes' flying time.

Cost of Aerial Seeding

The cost of seeding from a Beaver aircraft, using a ground party, has been calculated at about \$1.50 per acre. If no ground party was used and the seed was flown on by pilot judgment, the cost was \$1.40 per acre. Using a helicopter on a similar burn would cost about 15 cents more per acre. These costs fluctuate, depending on rental rates of aircraft and price of seed.

Helicopter vs. Airplane

The helicopter has several advantages over the airplane.

- It can land close to the seeding area and so cut down ferry time.
- It can fly low and turn rapidly at the end of a run.
- The flight strips are more accurate because the flagmen can easily be seen.

Its disadvantages are mainly its higher rental and its low payload; it needs to land every 60 acres.

On large burns, where the run is long and straight, a fixed-wing aircraft is more satisfactory, especially if there is a landing place close by. Where a patchy burn makes short runs necessary or where hilly country makes flying dangerous, a helicopter is more satisfactory.

FORAGE RETURNS

Forage yields from seeded areas, both logged and burned, vary considerably from site to site depending on the soil and available moisture. Test plots (Table 1) have shown that scarifying the ground increases production from grazing plants but seeded areas always produce more than even the most vigorous native stands.

On burned or logged areas, pinegrass yields twice as much as on undisturbed areas (Table 1). When the disturbed areas are seeded they may yield almost three times as much as when not seeded.

The cover picture shows a solid stand on a burned area three years after seeding. Such a stand gives high yields of forage and often suppresses most of the native vegetation.

Table 1.—Average Forage Yields in Pounds per Acre (1960-1961) from Seeded and Nonseeded Forest Ranges

Type of disturbance	Elevation feet	Year seeded	Yield ¹ pounds	Plant cover
<i>Sullivan Valley</i>				
Logged	2,500	1952	750	Kentucky bluegrass
Logged	2,400	1954	1,490	Timothy, orchardgrass, bromegrass
<i>Aspen Grove</i>				
Logged	3,500	1956	3,031	Timothy, orchardgrass
Burned	3,500	1958	3,012	Timothy, orchardgrass
Burned	3,600	Not seeded	1,135	Pinegrass
Not disturbed	3,600	Not seeded	444	Pinegrass
<i>Falkland</i>				
Burned	2,100	1958	1,466	Crested wheatgrass
Burned	2,100	Not seeded	868	Native grasses
Burned	3,000	1958	1,456	Timothy, orchardgrass
Burned	3,000	Not seeded	980	Pinegrass
Burned	3,800	1958	1,533	Timothy, orchardgrass
Not disturbed	3,800	Not seeded	262	Pinegrass

¹Ovendry weights.

If a range that yields 500 pounds of native forage per acre is logged and then seeded, it will yield about 1,500 pounds of forage per acre in the first year after seeding. The increased returns on a seeded-acre basis will be as follows:

Average annual yield of forage per acre for eight years after seeding = 1,200 pounds

Average annual yield of forage per acre for the same period, not seeded = 500 pounds

Average gain per acre = 700 pounds

Average value (assuming 1,000 pounds of forage is worth \$5) = \$3.50

Increase in value = $\frac{\text{total value (8 years)}}{\text{cost of seeding}} = \frac{28}{4} = 7 \text{ times}$

Seeding forest range is simple and beneficial to all land users, and is profitable to the range user.

APPENDIX

Common Grasses and Legumes Used in Seeding Forest Ranges, Their Characteristics, and Management Suggestions

Grass or legume	Seeds per pound	Adaptation to climate	Adaptation to soil	Growth characteristics	Management
Timothy	1,230,000	Cold-resistant Withstands moderate flooding	Tolerates wide range of soils but does best on heavy soils	Medium long-lived bunch-grass Palatable at all stages Quick to establish Adapted to moist grass	Does not stand grazing
Orchardgrass	654,000	Shade-tolerant Not drought-tolerant Suited to cool growing	Grows on thin, infertile soils but responds to good fertility Not alkali-tolerant	Long-lived bunchgrass Produces early spring growth and rapid re-growth after grazing	Easily established Best sown in mixtures
Smooth brome-grass	136,000	Moderately drought-resistant Cold-tolerant	Tolerates some alkali Does best on well-drained loams	Leafy, sod-forming, long-lived Good cool-season grass Palatable at all stages	Easily established Sod binds unless fertilized Does best if sown with a legume
Intermediate wheatgrass	88,000	Similar to smooth brome but not winter-hardy	Requires medium to high fertility and good drainage Tolerates some alkali	Rather short-lived Restricted creeping habit Late maturing Somewhat coarse growth	Easily established Does well with a legume
Crested wheatgrass	175,000	Very drought-resistant Very cold-resistant	Grows on poor soil Requires well-drained soil	Long-lived bunchgrass Root system extensive	Best for spring and fall grazing

APPENDIX—Concluded

Common Grasses and Legumes Used in Seeding Forest Ranges, Their Characteristics, and Management Suggestions

Grass or legume	Seeds per pound	Adaptation to climate	Adaptation to soil	Growth characteristics	Management
Crested wheatgrass (cont'd)			Moderately alkali-tolerant	Grows early in the spring but dormant in summer Cures well Not palatable when mature Establishes slowly	Survives close grazing and trampling
Kentucky bluegrass	2,177,000	Cold-tolerant Moderately drought-tolerant Stands moderate flooding	Adapted to a wide variety of soils Tolerates some alkali Grows wild on many of our grasslands	Long-lived sod-former Produces a tight sod that allows few weeds Low growth makes a good bottom grass	Requires ample moisture and high fertility for high production Best suited for pasture Withstands trampling
Big bluegrass	882,000	Cold-tolerant Moderately drought-tolerant	Similar to Kentucky bluegrass	Vigorous perennial bunchgrass Palatable Very early growth	Does not stand heavy grazing or trampling
Tall oatgrass	150,000	Does best in cool, moist areas Not drought- or heat-resistant	Adapted to a wide range of soils	Long-lived bunchgrass Palatable Quick to establish and to recover	Does not stand close grazing

Alsike clover	700,000	Does well under cool, wet conditions Tolerates poor drainage	Adapted to a wide range of soils	A short-lived perennial	Not much aftermath Does not stand close grazing
White clover	800,000	Cold-resistant and somewhat drought-tolerant	Does best on medium soils	A long-lived creeper Slow to become established	Withstands close grazing and trampling

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