

Forage Species for Reseeding Northeastern Washington Rangeland

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THE SIX NORTHEASTERN Washington counties, Ferry, Lincoln, Pend Oreille, Spokane, Stevens, and Whitman, have an estimated 3 million acres of deteriorated but potentially productive rangeland. Rehabilitation of this acreage through reseeded with desirable forage species and proper management thereafter would provide a greater supply of needed range forage and livestock products. At present Washington produces somewhat less than half of the beef consumed within this state and considerably less than half the consumption of mutton.

Lands of northeastern Washington offering extensive reseeded possibilities can be placed in two categories: (1) Approximately 1 million acres of woodland that has been cleared, cropped, and abandoned, most of which is in Ferry, Pend Oreille, and Spokane Counties; and (2) about 2 million acres of marginal cropland and scabland in Lincoln, Whitman, and Spokane Counties. Unsuccessful attempts to crop lands in both categories resulted in their abandonment. Past grazing practices have also contributed to the deterioration of these lands, which now produce inferior forbs, low-value annual grasses, and shrubby species with only a remnant of the climax vegetation.

Species adaptability and season of seeding tests, which have been conducted since 1948 by the Inland Empire Research Center of the Northern Rocky Mountain Forest and Range Experiment Station in cooperation with local ranchers, the Washington Agricultural Experiment Station, and the Soil Conservation Service, indicate that rehabilitation can be achieved largely by artificial reseeded with desirable species.

The Experimental Areas

Test areas in Lincoln County representing marginal cropland and in Ferry and Spokane counties typical of cleared woodlands were selected for study. Elevation is essentially similar: 2,200 feet at the areas in Lincoln and Spokane counties and 2,450 feet at the Ferry County area. At the Lincoln County area precipitation averages 11.5 inches annually with about half

occurring during the winter months November through February. The soil here has been classified as a Hesseltine loam: a 6-inch brown loam surface layer underlain by 3 to 5 feet of rocky loam subsoil beneath which is the basaltic bedrock. The Ferry County area is located on a well-drained sandy loam soil underlain by gravel. This site receives about 14 inches of precipitation annually, one half of which occurs during the months April through September. Also representative of cleared woodlands is the Spokane County test area with a gravelly loam soil formed from glacial outwash materials and characterized by a weak profile development. Annual precipitation here averages slightly more than 20 inches with about a third occurring in the months of April through September.

The soils of all test areas lack organic matter and have a low water-holding capacity. The main vegetation cover consists of annual grasses, inferior forbs, and some shrubby species.

Methods

Spring and fall seedings of grass and legume species, strains, and varieties were made in Ferry, Lincoln, and Spokane counties (Table 1). Each species was seeded with a Planet Jr. seeder in a plot consisting of three 18-foot rows spaced 1.5 feet apart. The seedbed was plowed, disked, and harrowed before seeding. Relative success of all seedings was determined periodically throughout each growing season, using a rating scheme that considered the number of seedlings per lineal foot of row space and plant survival and vigor. Five rating classes—excellent, good, fair, poor, and failure—were used. Competing weeds were removed for two years following seeding at least once but not more than twice during the growing season.

Results

Season of Seeding. Ratings based on plant vigor, volume of herbage produced, and plant distribution within the stand showed that for all species, spring seeding was superior to fall seeding. At all three locations a higher percentage of species produced excellent, good, and fair stands when spring seeded (Table 2). This was particularly striking at the Lincoln County area. Winterkill was thought to have caused the high incidence of failures and extremely poor stands in the fall seedings. Although the late-fall-seeded species had not emerged before low temperatures set in, germination in the soil had occurred. Prolonged below-freezing temperatures, combined with a limited snow cover, apparently killed the young plants. The early fall-seeded species were similarly affected because lack of soil moisture at the time of seeding retarded germina-

TABLE 1. AVERAGE RELATIVE ADAPTABILITY RATINGS¹ OF SPECIES TESTED BY LOCATION AND SEEDING SEASON.

| Species | Ferry Co. | | Lincoln Co. | | Spokane Co. | |
|--|--------------------|-------|-------------|-------|-------------|-------|
| | Spring | Fall | Spring | Fall | Spring | Fall |
| <i>Agropyron cristatum</i> (standard crested wheatgrass) | E (3) ² | G (3) | E (3) | P (3) | E (2) | P (2) |
| <i>A. cristatum</i> , Fairway (Fairway crested wheatgrass) | E (3) | G (3) | E (3) | P (2) | E (2) | P (2) |
| <i>A. cristatum</i> , 571 (crested wheatgrass 571) | E (1) | G (1) | E (2) | F (2) | E (2) | P (2) |
| <i>A. elongatum</i> (tall wheatgrass) | E (3) | G (2) | G (3) | P (3) | P (2) | P (2) |
| <i>A. inerme</i> (beardless bluebunch wheatgrass) | G (3) | F (3) | F (2) | P (1) | G (2) | P (2) |
| <i>A. intermedium</i> (intermediate wheatgrass) | G (3) | G (3) | E (3) | P (3) | E (2) | P (2) |
| <i>A. riparium</i> (streambank wheatgrass) | — | F (1) | G (2) | P (3) | G (1) | P (2) |
| <i>A. sibiricum</i> (Siberian wheatgrass) | E (1) | G (1) | E (3) | P (2) | G (2) | P (1) |
| <i>A. smitbii</i> (western wheatgrass) | G (3) | F (3) | E (3) | P (3) | F (2) | P (2) |
| <i>A. trachycaulum</i> (common slender wheatgrass) | G (3) | F (3) | P (1) | — | X (2) | X (2) |
| <i>A. trachycaulum</i> , Primar (Primar slender wheatgrass) | E (3) | G (3) | E (3) | P (3) | E (2) | P (2) |
| <i>A. trichophorum</i> (pubescent wheatgrass) | E (3) | G (3) | E (2) | X (3) | E (2) | P (2) |
| <i>Agrostis alba</i> (red top) | — | F (1) | — | — | — | — |
| <i>Alopecurus pratensis</i> (meadow foxtail) | — | P (1) | — | — | — | — |
| <i>Arrhenatherum elatius</i> , Tualatin (tall oatgrass) | — | P (1) | — | — | — | — |
| <i>Astragalus falcatus</i> (sicklepod milkvetch) | — | — | F (1) | — | P (2) | P (2) |
| <i>Bromus inermis</i> , Lancaster (Lancaster smooth brome) | — | — | E (1) | P (1) | — | — |
| <i>Bromus inermis</i> , Lyon (Lyon smooth brome) | — | — | E (1) | P (1) | — | — |
| <i>Bromus inermis</i> , Manchar (Manchar smooth brome) | G (3) | G (3) | E (3) | P (3) | G (2) | P (2) |
| <i>B. marginatus</i> (common mountain brome) | F (3) | P (3) | P (1) | — | P (2) | P (2) |
| <i>B. marginatus</i> , Bromar (Bromar mountain brome) | G (3) | F (3) | G (3) | X (3) | P (2) | P (2) |
| <i>Dactylis glomerata</i> (orchardgrass) | E (3) | P (3) | G (3) | X (3) | G (2) | F (2) |
| <i>Elymus glaucus</i> (blue wildrye) | — | X (1) | — | — | — | — |
| <i>E. junceus</i> (Russian wildrye) | G (3) | P (3) | F (1) | — | P (2) | P (2) |
| <i>Festuca elatior</i> var. <i>arundinacea</i> (tall fescue) | G (3) | F (3) | G (3) | X (3) | F (2) | P (2) |
| <i>F. idahoensis</i> (Idaho fescue) | — | — | F (3) | P (3) | F (2) | F (2) |

Forage Species for Reseeding Washington Rangeland

TABLE 1 (CONTINUED)

| Species | Ferry Co. | | Lincoln Co. | | Spokane Co. | |
|--|-----------|-------|-------------|-------|-------------|-------|
| | Spring | Fall | Spring | Fall | Spring | Fall |
| <i>F. ovina</i> (sheep fescue) | F (3) | F (3) | G (3) | P (3) | P (1) | F (2) |
| <i>F. ovina</i> var. <i>durinuscula</i> (hard fescue) | — | — | F (3) | P (3) | F (2) | F (2) |
| <i>Lolium perenne</i> (perennial ryegrass) | — | P (1) | — | — | — | — |
| <i>Lotus uliginosus</i> (big trefoil) | X (1) | X (1) | X (1) | — | — | — |
| <i>L. uliginosus</i> , Granger (Granger big trefoil) | P (1) | — | E (1) | — | F (1) | — |
| <i>Medicago falcata</i> (Siberian alfalfa) | — | — | E (1) | X (1) | — | — |
| <i>M. sativa</i> var. <i>media</i> , Ladak (Ladak alfalfa) | P (2) | P (2) | G (3) | P (3) | F (2) | P (2) |
| <i>M. sativa</i> var. <i>media</i> (creeping alfalfa) | P (1) | F (1) | G (2) | X (3) | P (2) | X (2) |
| <i>Oryzopsis hymenoides</i> (Indian ricegrass) | — | F (1) | G (2) | P (3) | F (1) | F (2) |
| <i>Phalaris arundinacea</i> (Reed canary grass) | P (3) | X (3) | P (3) | X (3) | — | — |
| <i>Pleium pratense</i> (timothy) | P (3) | F (3) | F (3) | P (3) | P (2) | P (2) |
| <i>Poa ampla</i> (big bluegrass) | F (2) | F (2) | P (1) | — | P (2) | P (2) |
| <i>P. bulbosa</i> (bulbous bluegrass) | F (2) | F (2) | X (1) | — | P (2) | F (2) |
| <i>P. canbyi</i> (Canby bluegrass) | — | — | X (1) | — | P (2) | P (2) |
| <i>P. compressa</i> (Canada bluegrass) | P (2) | P (2) | X (1) | — | P (2) | P (2) |
| <i>P. pratensis</i> (Kentucky bluegrass) | P (2) | P (2) | P (1) | — | — | — |
| <i>Sanguisorba minor</i> (small burnet) | P (2) | P (3) | F (3) | X (3) | — | — |
| <i>Secale montanum</i> (mountain rye) | — | — | G (1) | X (1) | — | — |
| <i>Stipa viridula</i> (green needlegrass) | F (2) | P (2) | P (1) | — | F (2) | P (2) |
| <i>Trifolium fragiferum</i> (strawberry clover) | X (1) | X (1) | — | — | — | — |
| <i>T. repens</i> , Ladino (Ladino white clover) | X (1) | X (1) | — | — | — | — |

¹ Relative ratings: E = Excellent
 G = Good
 F = Fair
 P = Poor
 X = Failure
 — = Not planted

² Numbers in parentheses show the number of years seedings were made.

tion. Even though seedlings of some species had emerged when freezing occurred, the plants were not adequately established to withstand the low temperatures.

At the locations in Ferry and Spokane counties the differences were not as striking; but at both of these sites spring seedings were also more successful than fall seedings. The one early fall seeding made in Ferry County did not appear to have any advantage over those made in late fall.

Promising Forage Plants. Several species used in these tests showed excellent adaptability to soil and weather conditions at the study areas. However,

TABLE 2. RATINGS BY SEASON AND YEAR OF ALL SPECIES SEEDED IN FERRY, LINCOLN, AND SPOKANE COUNTY TESTS

| Location, season, and year | Percentage of species | | | | |
|----------------------------|-----------------------|------|------|------|---------|
| | Excellent | Good | Fair | Poor | Failure |
| FERRY COUNTY | | | | | |
| <i>Spring seeding</i> | | | | | |
| 1949 | 4 | 40 | 12 | 44 | 0 |
| 1950 | 37 | 27 | 0 | 26 | 10 |
| 1951 | 59 | 9 | 14 | 14 | 4 |
| Weighted average | 32 | 26 | 8 | 29 | 5 |
| <i>Fall seeding</i> | | | | | |
| 1948 late | 4 | 42 | 8 | 33 | 13 |
| 1949 late | 15 | 15 | 26 | 29 | 15 |
| 1950 early | 0 | 41 | 18 | 32 | 9 |
| 1950 late | 0 | 57 | 26 | 17 | 0 |
| Weighted average, late | 7 | 35 | 21 | 27 | 10 |
| LINCOLN COUNTY | | | | | |
| <i>Spring seeding</i> | | | | | |
| 1950 | 44 | 15 | 0 | 31 | 10 |
| 1951 | 86 | 14 | 0 | 0 | 0 |
| 1952 | 55 | 26 | 13 | 3 | 3 |
| Weighted average | 57 | 19 | 4 | 14 | 6 |
| <i>Fall seeding</i> | | | | | |
| 1950 early | 0 | 0 | 0 | 56 | 44 |
| 1950 late | 0 | 0 | 0 | 75 | 25 |
| 1951 late | 0 | 0 | 7 | 70 | 23 |
| Weighted average, late | 0 | 0 | 4 | 72 | 24 |
| SPOKANE COUNTY | | | | | |
| <i>Spring seeding</i> | | | | | |
| 1951 | 14 | 21 | 10 | 48 | 7 |
| 1952 | 19 | 16 | 35 | 25 | 5 |
| Weighted average | 17 | 18 | 24 | 35 | 6 |
| <i>Fall seeding</i> | | | | | |
| 1950 late | 10 | 32 | 23 | 29 | 6 |
| 1951 late | 0 | 0 | 3 | 83 | 14 |
| Weighted average | 5 | 15 | 12 | 58 | 10 |

their adaptability cannot be fully appraised in the relatively short period that the seedings have been observed and may have to be revised as more data become available. Vigor of plants, as determined by height and abundance of leafage and fruiting stalk production, and uniform distribution of plants within the rows were the criteria used to evaluate species adaptability.

Relative ratings of species tested are shown in Table 1. At the Lincoln County location where the soils are the least droughty, stands produced by several species of wheatgrass, Manchar smooth brome,¹ tall fescue, mountain rye, and Ladak alfalfa have been outstanding when seeded in the spring. A group of species that produced less satisfactory stands but plants of equal thrift included beardless bluebunch and Primar slender wheatgrasses, Bromar mountain brome, and Idaho and sheep fescues. Good first-year stands of orchardgrass and timothy plants failed almost completely in the second growing season. Three species of bluegrass (bulbous, Canby, and Canada) seeded in 1950 were the only failures experienced with spring seedings in the Lincoln County test. Fall seedings at this location, excepting fair stands of crested wheatgrass (571), have resulted in either unsatisfactory stands of plants in poor vigor or complete failures.

Producing very good stands in Ferry County in both the spring and fall seedings were three varieties of crested wheatgrass, and intermediate, tall, Primar slender, and pubescent wheatgrasses. In addition, beardless bluebunch, wheatgrass, common slender wheatgrass, orchardgrass, Bromar mountain brome, and Manchar smooth brome were outstanding in the spring seedings. Of these latter species, somewhat less successful stands resulted when seeded in the fall with the exception of orchardgrass, which produced very poor stands. Western wheatgrass and Russian wildrye produced less satisfactory stands in the spring seedings than other spring-seeded species, but the plants were exceptionally thrifty. Very poor stands of common mountain brome, green needlegrass, several bluegrass species, Ladak and creeping alfalfa, and small burnet were produced in both spring and fall seedings. Failures in the spring and fall seedings were experienced with Ladino and strawberry clovers and big trefoil. Reed canary grass also failed in the fall seedings. Performance of several other species seeded in the fall and spring of one year only is inconclusive and has not been included here. The single early fall seeding in 1950 did not appear to have any advantage over the later seeding.

At the Spokane County location, where the trials have been made for only two years, crested, intermediate, beardless bluebunch, Primar slender, and pubescent wheatgrasses, orchardgrass, and Manchar smooth brome were out-

¹Common and scientific names appear in Table 1.

standing in the spring seedings. Producing less satisfactory stands and plants with less vigor were Siberian, streambank, and western wheatgrasses, and Idaho, tall, and hard fescues. Several of the bluegrasses, mountain brome, green needlegrass, sickle pod milkvetch, and alfalfa were unsatisfactory in all respects. The results obtained from the fall seedings were inconsistent and cannot be properly evaluated. In the 1950 seeding, crested, intermediate, Primar slender, and pubescent wheatgrasses, orchardgrass, hard, sheep, tall, and Idaho fescues, and timothy became successfully established. These species and others produced unsatisfactory stands in the succeeding fall (1951) seeding, many of which failed completely.

Received March 12, 1953