Range Seedings Versus Climax Vegetation on Three Sites in Idaho¹

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Highlight

Total annual herbage yields on three range sites in Eastern Idaho in climax condition are compared with yields of introduced grasses and legumes on the same sites. Yields of introduced grasses and legumes exceeded yields of climax vegetation on all three range sites studied.

In the late nineteen fifties and early sixties, thousands of acres of dry farmland in eastern Idaho were put in the soil bank. Under this program, farmers were encouraged to take land out of wheat production and retire it to grass for a specific contract period-usually 5 to 10 years. Terms of the contract required seeding the retired land to grass or grasslegume mixtures for soil protection and improvement. The resulting forage could not be harvested or grazed during the contract period. Seedings were established by drilling in late fall into grain stubble or summer fallow. No fertilizer was used either during establishment or in subsequent years on the plantings studied. Many excellent stands of grass on different soil series and in different rainfall zones presented an opportunity to compare relative yields over a period of years.

Procedures

Beginning in 1961, eleven seedings, four to five years old, were selected for collecting yield information. They were chosen to represent important range sites in eastern Idaho of owners whose soil bank contracts had several years to run to insure at least four years of yield data. Only fields that had full, uniform stands of the seeded species were selected. Differences in yield, due to variation in the stand were eliminated. The stands selected would be considered good or better for the site. Insofar as possible, fields were chosen which had uniform soils so that yields could be correlated with a specific range site.

Range managers and ranchers frequently face the decision of either managing a good stand of native species on a seedable range site or plowing the site and planting to introduced grasses and legumes. Many investigators have described the increases in forage production made possible by seeding deteriorated ranges. This study compares total annual yield of vegetation on three range sites in excellent range condition (climax vegetation) with yield of introduced grasses and legumes on the same range sites. Range sites studied were the Loamy 8 to 12 inch precipitation zone, Loamy 12 to 16 inch precipitation zone, and Loamy 16 to 22 inch precipitation zone in eastern Idaho. The term "range site" is used here as applied by the Soil Conservation Service in making range inventories and as discussed by Dyksterhuis (1949) and Heerwagen (1959).

The studies were made on three major soil series: Lantonia, Tetonia, and Pancheri. These soils correlate with the Loamy 16 to 22 inch, Loamy 12 to 16 inch, and Loamy 8 to 12 inch range sites respectively. Table 1 provides brief descriptions of these soils.

The double plot sampling method as described by Wilm, Costello and Klipple (1944) and Frischknecht and Plummer (1949) was used to determine total herbage yield. Plants were clipped at ground level. Samples of fresh material were kept for airdry weights.

Concurrently, the Soil Conservation Service Soil-Range Interpretative Team of H. B. Passey and V. K. Hugie (1962, 1963) were conducting studies on native ranges in climax condition in south-central Idaho. They measured total production on 52 different study areas, seven of which were on soils which correlate into the same range sites mentioned above. These studies were made on the Roseworth, Neeley, and Pancheri soil series in the Loamy 8 to 12 inch range site and on the

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Name	Classification	Elev. (ft.)	Ppt. (inch)	Effective depth (inch)	Range site
Lantonia silt	Pachic	5800-7000	15-18	> 40	Loamy
loam	Cryoborolls				16 to 22 inches
Tetonia silt	Pachic	5500-7000	13-15	> 40	Loamy
loam	Cryoborolls				12 to 16 inches
Pancheri silt	Xerollic	4200-6000	8-12	> 40	Loamy
loam	Calciorthids,				8 to 12 inches
	Frigid				
Roseworth silt	Orthidic	5000-5600	11-13	20-40	Loamy
loam	Durixerolls,				8 to 12 inches
	Frigid				
Neeley silt	Calciorthidic	4000-5000	11-13	> 40	Loamy
loam	Haploxerolls				8 to 12 inches
	Mesic				
Clegg silt	Calcic Pachic	5600-7300	15-20	> 40	Loamy
loam	Argixerolls,			·	12 to 16 inches
	Frigid				
Bancroft silt	Calcic	4500-6500	13-16	> 40	Loamy
loam	Argixerolls			- ·	12 to 16 inches

Table 1. Soil descriptions.*

* Max Daniels, Soil Scientist, SCS, Boise, Idaho.

Clegg and Bancroft series in the Loamy 12 to 16 inch range site.

Although Hugie and Passey did not have study sites in eastern Idaho on the Loamy 16 to 22 inch range sites, native range yield information was available from the Teton Soil Survey Report (Soil Conserv. Serv., (1969) and the Bingham Soil Survey Report (Soil Conserv. Serv., unpublished). These sources of information were used to compare yields on rangeland in climax condition and yields from the same soils that had been seeded to introduced grasses and legumes.

In the study area, precipitation was slightly below average in 1961 and above average in 1962, 1963 and 1964.

Results

Loamy 8 to 12 inch range site.—This site occurs on the Pancheri, Neeley, Roseworth, and similar soil series. Yields of crested wheatgrass (Agropyron cristatum) and Siberian wheatgrass (Agropyron sibericum) average 1,182 pounds air-dry herbage per acre over a four year period at three different study locations (Table 2). Average yield of native range in excellent condition on the same range site for the same four years on four study sites was 808 pounds per acre (Table 3). Figure 1 illustrates variability by years. When seeded to introduced grasses, the Loamy 8 to 12 inch range site averaged about 375 pounds more per acre per year than the same site in climax condition. Composition of the climax vegetation on this site is approximately as follows:

Grasses

Forbs

30%-50%	Dominated by bluebunch wheatgrass (Agropyron spicatum), Thurber nee- dlegrass (Stipa thurberiana), and blue- grasses (Poa secunda).
10%-35%	Dominated by balsamroot (Balsamo-

Shrubs

10%-35% Dominated by big sagebrush (Artemisia tridentata) and three-tip sage-

brush (A. tripartita).

rhiza sagittata), Phlox sp., and taper-

tip hawksbeard (Crepis acuminata).

Table 2. Yields (lbs./acre, air dry) of seeded ranges.

				Yields		
Range site	Soil series	1961	1962	1963	1964	Average
Loamy, 8 to 12 inch ¹	Pancheri	724	1046	1634	1320	1182
Loamy, 12 to 16 inch ²	Tetonia	1905	2749	3848	3251	2782
Loamy, 16 to 22 inch ²	Lantonia	2884	4286	4945	5680	4272

¹ Average of 3 seedings.

² Average of 4 seedings.

			Year		
Range site & soil series	1961	1962	1963	1964	Average
Loamy 8 to 12 inch					
Roseworth silt loam	583	724	1089	943	835
Neeley silt loam	589	849	957	756	788
Neeley silt loam	614	1339	1173	757	971
Pancheri silt loam	639	738	618	559	638
Average	606	912	959	754	808
Loamy 12 to 16 inch					
Clegg silt loam	1138	1307	1320	1138	1226
Bancroft silt loam	1312	1458	1042	1192	1251
Average	1225	1382	1181	1165	1238
Loamy 16 to 22 inch					
Lantonia-like					2200

 Table 3. Total herbage yields (lbs./acre, air dry) on three range sites in climax condition in Idaho.¹

¹Yields for Roseworth, Neeley, Pancheri, Clegg, and Bancroft soil series are from Hugie, Passey and Williams, Soil Conservation Service, Portland, Oregon, Soil-Range Investigations, unpublished.

Loamy 12 to 16 inch range site.—This site occurs on Tetonia, Clegg, Bancroft, and similar soil series. Seedings were measured on the Tetonia series and were mixtures of intermediate wheatgrass (Agropyron intermedium) and alfalfa (Medicago sativa) or Manchar smooth brome (Bromus inermis) and alfalfa. One seeding was smooth brome grass alone. Avcrage yields for the four study years, 1961 through 1964, were 2,782 pounds per acre per year (Table 2).



FIG. 1. Comparison of annual yields between seeded range and climax condition range. Loamy 8 to 12 inch range site. Pancherilike soils.

The same range site in climax condition averaged 1,238 pounds per acre per year on two soil series (Clegg and Bancroft) for the four-year period (Table 3). Seedings with alfalfa in the mixture produced over twice as much as the native range. With smooth brome alone, the site out-yielded native range by over 500 pounds per acre. Figure 2 illustrates variability by years. Composition of the climax vegetation on this site is approximately as follows:

65%-80%	Dominated by bluebunch wheatgrass, Idaho fescue (Festuca idahoensis), and bluegrasses.
15%–20%	Dominated by tapertip hawksbeard, balsamroot, and Phlox sp.
10%–20%	Dominated by big sagebrush and three- tip sagebrush.
	65%-80% 15%-20% 10%-20%

Loamy 16 to 22 inch range site.—This site occurs on the Lantonia, Karlan, Robin, and similar soil series. Seedings were measured on the Lantonia soil series and consisted of intermediate wheatgrass, Manchar smooth brome and one crested wheatgrass seeding, all with alfalfa. Average yield for four years on four study sites was 4,272 pounds per acre (Table 2). No figures are available by individual years for the native range. However, average yields on these soils of native species is approximately 2,200 pounds (Teton Soil Survey Report, 1969; Bingham



FIG. 2. Comparison of annual yields between seeded range and climax condition range. Loamy 12 to 16 inch range site. Tetonia-like soils.



FIG. 3. Comparison of annual yields between seeded range and climax condition range. Loamy 16 to 22 inch range site. Lantonia-like soils.

County Soil Survey Report, unpublished). Seeded sites average about twice the production of the native range (Fig. 3). Composition of the climax vegetation on the site is approximately as follows:

Grasses

55%-75% Dominated by Idaho fescue, bluegrasses, bluebunch wheatgrass, bearded wheatgrass (A. subsecundum), and prairie junegrass (Koleria cristata).

Forbs

10%-25% Dominated by geranium (Geranium fremonti), lupine (Lupinus sp.), balsamroot, and western yarrow (Achillea lanulosa).

Shrubs

Dominated by bitterbrush (Purshia tri-5%-10% dentata), snowberry (Symphoricarpos sp.), and serviceberry (Amelanchier alnifolia).

Discussion

This study indicates that three range sites in eastern Idaho will produce significantly more herbage when seeded to introduced grasses and legumes than they will in climax condition.

The increased production of seeded ranges over the native range for a four-year period average 146% for the Loamy 8 to 12 inch site, 224% for the Loamy 12 to 16 inch site, and 194% for the Loamy 16 to 22 inch site.

Since native ranges grow significant percentages of plants that are only lightly used by some classes of grazing animals, the spread between stocking rates would be even higher. Many investigators have demonstrated the dramatic increases when poor condition ranges are seeded. This study indicates that good seedings will produce significantly more than the best native ranges on the sites and soils studied. However, it may seldom be desirable to convert seedable, climax condition ranges to introduced grasses and legumes. Several factors must be considered. In some cases, the variety of forage offered by the native range is more valuable to both wildlife and livestock than the single or dual species seeding. In addition, such things as kind and class of livestock, seasonal forage balance, possible effects on the range ecosystem, wildlife, and cost-benefits must be carefully evaluated. Therefore, even though a given site might be capable of producing more pounds of forage from introduced species, other factors often weigh in favor of leaving it in native vegetation.

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