

Growth Characteristics of Crested and Fairway Wheatgrasses in Southern Idaho¹

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Highlight

Crested and fairway wheatgrasses have been growing together and spreading in southern Idaho for over 30 years and are well-adapted to Idaho. We found that fairway produces only 79% as much herbage as crested, but that it had spread 112% further by seed and is grazed more uniformly. Both species spread more in eastern than in southwestern Idaho.

Crested wheatgrass was first seeded in southern Idaho in 1932 at the U. S. Sheep Station² near Dubois. It has been widely used and is well adapted for seeding

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Most of the early seedings reported here were made by or in cooperation with ranchers; the Intermountain Forest and Range Experiment Station, U. S. Forest Service (experimental range seeding phases now Plant Science Research Division, Agricultural Research Service); Rural Resettlement Administration (land now administered by U. S. Forest Service and Bureau of Land Management); Bureau of Animal Industry (now Agricultural Research Service); Bureau of Land Management; and the University of Idaho. Thanks are extended to cooperating agencies and to all who helped with field work or made helpful comments on this paper.

² The U. S. Sheep Experiment Station near Dubois, Idaho, is maintained by the Animal Science Research Division, Agricultural Research Service, U. S. Department of Agriculture, in cooperation with the Intermountain Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, and with the Agricultural Experiment Station of the University of Idaho.

southern Idaho ranges (Hull and Holmgren, 1964; Hull and Klomp, 1966).

The taxonomic status of "crested" wheatgrass is unsettled. Dewey (1969) and Dewey and Pendse (1968) conclude that the presence of only one basic genome suggests the inclusion of all members of the "crested" wheatgrass complex into a single large polytypic species. They recognize, however, that this complex has morphological, ecological, and cytological variations which reflect subspecies differences, and that the diploids, tetraploids and hexaploids could be designated as three subspecies. Fairway wheatgrass (*Agropyron cristatum* (L.) Gaertn.) would be in the diploid group and crested wheatgrass (*Agropyron desertorum* (Fisch.) Schult.) in the tetraploid group. Other workers (Konstantinov, 1923; Swallen and Rogler, 1942; and Knowles, 1955) also recognize that fairway and crested wheatgrasses are different enough to be separated at least on a subspecies level. Differences which some of these workers cite for crested wheatgrass as compared with fairway are: taller and more tufted growth; higher herbage and seed yields; coarser stems and leaves; less leafy; longer heads with spikelets more closely appressed to the axis; narrower spikelets; and seeds larger and less awntipped.

Comparisons of the two wheatgrasses by workers in southern Idaho and adjacent states indicate that fairway spreads more rapidly by seed, is finer and leafier and grazed more uniformly. It grows up to 1,500-ft higher elevations, and is more shade tolerant (Plummer et al., 1955; Hull and Holmgren, 1964; Hull and Klomp, 1966). Eckert et al. (1961) reported a mixture of crested and fairway wheat-

grasses seeded in Nevada in 1940. By 1961, crested wheatgrasses was dominant on the xeric sites and fairway on the more mesic sites.

This paper is concerned mainly with the yield and spread of crested and fairway wheatgrasses in southern Idaho.

Procedures

Crested and fairway wheatgrasses were planted either in experimental plots or in large seedings at 15 locations. We sampled these 15 areas for yields in most years from 1946 to 1970. Samples were clipped to an approximate 0.5-inch stubble height, and air-dry weights were obtained. Seven of the 15 areas were open to grazing. On grazed areas, wire cages protected three to seven 4.8 or 9.6-ft² circular samples for each species. Spread was determined by measuring and/or estimating the area supporting the fair to good stand of each species outside of the area where it had been seeded. Only six areas had original borders distinct enough to determine spread in 1970. There were two to eight replications per area and these are averaged for the final figure. To determine growth rates and other characteristics, we measured, clipped, and observed 2-year-old plants in good stands in seeded rows every week in 1966 near Logan, Utah.

Results and Discussion

Observations on all areas where crested and fairway wheatgrasses are growing in southern Idaho indicate that crested outyields fairway. Air-dry yields on the 15 sampled areas averaged 1298 lb./acre for crested and 1019 or 79% as much for fairway wheatgrass (Table 1). Areas are grouped east to west. Only in 1962 at Taber and Almo and 1965 and Raft River, did fairway outyield crested wheatgrass. Yields varied with years. At Raft River, the area with the most years of record, crested wheatgrass yielded 2346 lb./acre in 1970, the highest of any years. Its lowest yield was 450 lb./acre in 1960. Fairway produced 1905 lb./acre in 1963 for its

Table 1. Characteristics of 15 sites in southern Idaho with average air-dry yield of crested (Agde) and fairway (Agcr) wheatgrasses, 1970.

Location	Elev. (ft)	Precip. (inch)	Year seeded	Yrs. of record ^a	Avg. yields (lbs./acre)	
					Agde	Agcr
Sheep Station						
#1	5500	10.9	1934 ^b	11(7)	1721	1394
#2	5500	10.9	1945	6	1844	1375
#3	5500	10.9	1946	14	1372	1169
Dubois Airport	5100	10.1	1940	14(10)	1349	1054
Lidys	5000	11.1	1941	10	1665	1341
Howe	4900	7.5	1962	5	919	706
Taber	4650	7.9	1934 ^c	16	1271	1022
Pocatello	4450	10.9	1943	11(6)	1266	961
Holbrook	4700	12.2	1937 ^d	10(25)	1272	978
Raft River	4350	9.7	1944	20	1161	939
Almo	5300	12.0	1949	10	1193	932
Orchard	3200	9.4	1942	8	871	718
Regina	3400	9.8	1944	14(11)	946	731
Arrowrock	4700	20.0	1936 ^e	22(9)	1951	1247
Reynolds Cr.	4400	12.2	1949	4	975	724
Average					1298	1019

^a Figures in parentheses are years of records for Agcr.

^b Agcr seeded 1952.

^c Agcr seeded 1946.

^d Agde seeded 1944.

^e Agcr seeded 1942.

highest and 375 lb./acre in 1960 for its lowest yield.

The spread of fairway wheatgrass by seed exceeded that of crested. The superior spreading ability of fairway was also noted by Hafenrichter et al. (1949). On the six areas where spread could be determined in 1970, fairway wheatgrass averaged 382% spread compared to 180% for crested (Table 2).

Table 2. Spread (%) of crested and fairway wheatgrasses beyond the original seeded areas at 6 sites in southern Idaho.

Location	Spread	
	Agcr	Agde
Sheep Station #2	585	138
Lidys	280	196
Raft River	579	288
Almo	515	285
Orchard	165	55
Regina	170	120
Average	382	180

Both species spread more rapidly than did Siberian wheatgrass (*Agropyron sibiricum*), intermediate wheatgrass (*A. intermedium*), pubescent wheatgrass (*A. trichophorum*), or Russian wildrye (*Elymus junceus*) which were also seeded on these six areas. Spread was mostly into cheatgrass (*Bromus tectorum* L.) and annual weeds on plots where other species had failed. Some spread was into fair to good stands of seeded and native species. Spread was most rapid on the upper Snake River Plains of eastern Idaho with slower spreading in southwestern Idaho. Moderate grazing did not seem to influence the rate of spread of either grass.

Some characteristics of fairway compared to crested wheatgrass plants determined in 1966 near Logan were as follows: plant height, 21 and 26 inches; crown diameter, 6.1 and 5.2 inches; number of culms per plant, 34 and 23; and number of seeds per seedhead, 30 and 12, respectively (Fig. 1).

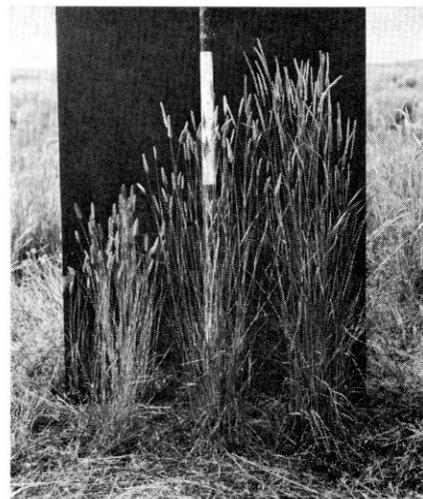


FIG. 1. Typical growth of fairway wheatgrass, left; crested wheatgrass, middle; and Siberian wheatgrass, right. Dubois, Idaho.

Fairway wheatgrass plants elongated more rapidly than did crested wheatgrass until late May, when they were exceeded in height by crested.

Whether the two species were mixed or in adjacent plots, fairway wheatgrass was grazed more uniformly than crested. Sheep and cattle grazed some plants of crested wheatgrass very closely and left some ungrazed. These ungrazed

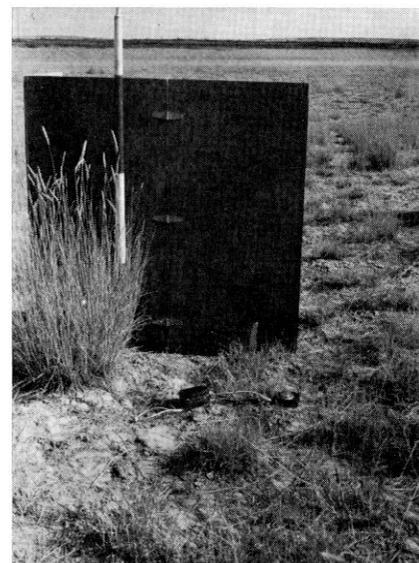


FIG. 2. Crested wheatgrass often is not grazed evenly. Right it is closely grazed; left is an ungrazed plant with 3-year-old seedstalks. Taber, Idaho.

plants often contained 2 to 4-year-old seed stalks. This rarely happened with fairway wheatgrass (Fig. 2). Under intensive management, however, where crested wheatgrass is heavily used for a short time, old ungrazed stalks are kept at a minimum.

Conclusions

Though fairway wheatgrass yields 21% less than crested, uniformity of grazing and its ability to spread 112% further are assets to be considered when seeding arid ranges.

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