TECHNICAL NOTES

Early Growth of Nordan Crested Wheatgrass and Sherman Big Bluegrass

L. R. RITTENHOUSE AND F. A. SNEVA

Highlight: Early growth of Sherman big bluegrass was compared with that of Nordan crested wheatgrass in central Oregon. Growth curves of the two grasses were similar between April 5 and May 15, as measured by increase in oven-dry production. Both species produced similarly during the 6-year study, except that, in 1969 big bluegrass yields were higher on May 15.

Sherman big bluegrass, a selection of *Poa ampla* Merr., has frequently been cited as a plant with very early growth (Hanson 1959; Vallentine 1971). Hyder and Sneva (1963) and Currie (1969) indicated that it reached a grazing readiness 2 to 4 weeks earlier than crested wheatgrass (*Agropyron desertorum* (Fisch.) Schult). This has led some to believe that its productivity during the early spring grazing period is greater than that of crested wheatgrass; however, published data to support this are lacking.

This study documents early spring production (April 5 to May 15) of Sherman big bluegrass and Nordan crested wheatgrass during 6 years on the high, cold desert of eastern Oregon.

Methods and Materials

Two adjacent stands of the two species were established in approximately 1-acre plots in 1966 on a uniform area located at

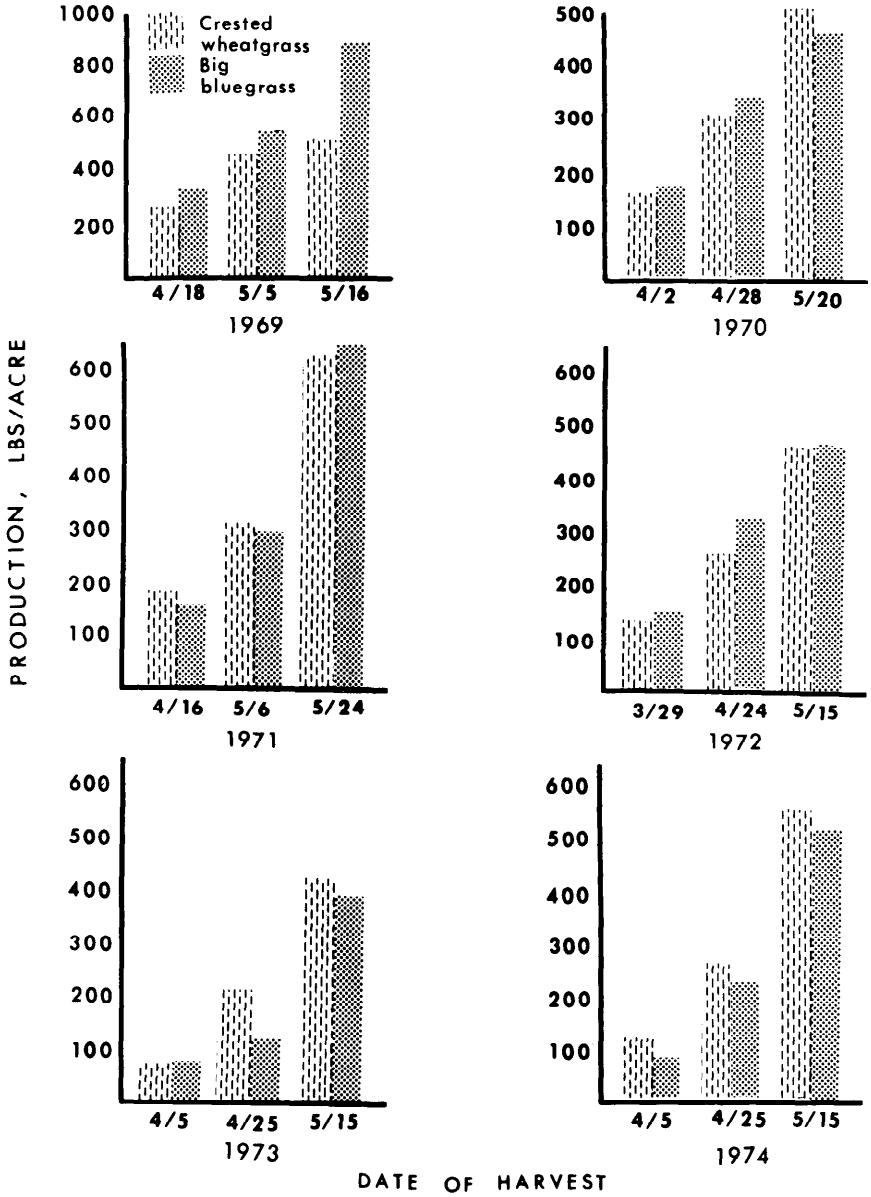

Fig. 1. *Spring production of crested wheatgrass and big bluegrass, 1969–1974.*

At the time of the research, authors were associate professor, Rangeland Resources Program, Eastern Oregon Agricultural Research Center, Squaw Butte Station, Burns; and range scientist, Agricultural Research Service, U.S. Department of Agriculture, Burns, Oregon 97720. Rittenhouse's current address is the Texas Agricultural Experiment Station, Chillicothe-Vernon Research and Extension Center, Vernon, Texas 76384.

The report involves cooperative investigations of the Oregon State Agr. Exp. Sta. and U.S. Dep. Agr., Agr. Res. Serv., Squaw Butte Experiment Station, Burns, Ore.; Oregon Agricultural Experiment Station Technical Paper No. 4268.

Manuscript received October 26, 1976.

Table 1. Regression statistics[1] for days after March 31 (X) and log yield (Y) as the independent and dependent variables, respectively.

Year	$\bar{X}$	Crested wheatgrass			Big bluegrass		
		log a	log b	$s_{y.x}$	log a	log b	$s_{y.x}$
1969	33	2.299	.00959	.00104	2.291	.01410	.02936
1970	27	2.197	.01013	.00630	2.275	.00699	.08480
1971	35	2.001	.01442	.02876	1.904	.01654	.02723
1972	23	2.196	.01361	.02021	2.276	.00907	.02540
1973	25	1.810	.01857	.06847	1.776	.01747	.09719
1974	25	2.058	.01505	.02375	2.709	.01806	.02775
Overall[2]	28	2.090	.01310	.09994	2.078	.01387	.16551

[1] The equation $Y = ab^X$ was transformed to log Y = log a + log bX for computation.
[2] r^2 = .85 and .70 for Crested wheatgrass and Big bluegrass, respectively.

the Squaw Butte Range Station, 40 miles west of Burns, Ore., at an elevation of 4,500 feet. Soils are sandy loams of basaltic and/or rhyolitic origin, and contain an impervious layer of calcium carbonate at about the 20-inch depth. Long-term annual precipitation is 11.5 inches, with about 60% falling as rain and snow during the six fall and winter months and about 25% as rain during May and June.

Each year from 1969 to 1974 production was estimated by clipping to ground level 16 randomly selected 24 ft² plots in each area on three dates between March 29 and May 24. In 1973 and 1974, additional plots were harvested following seed maturity to estimate mature herbage yield. Data were expressed as pounds of oven-dry forage per acre and analyzed as a factorial with species and dates of harvest as main effects. Each year was analyzed separately.

Results and Discussion

A significant species ($P<.01$) and species × date of harvest interaction ($P<.01$) occurred only in 1969. The probability of significant differences between species in other years was less than 0.10. Yield on three dates during the spring of 1969 to 1974 are shown in Figure 1.

Although big bluegrass was observed to begin culm elongation earlier than crested wheatgrass, growth curves were similar in all years except 1969. Both species increased in production at about the same rates ($P>.10$) in most years, i.e., on the average 3.0 and 3.6, 5.5 and 7.2, and 10.5 and 14.6 lb/acre/day for crested wheatgrass and big bluegrass on April 5, 25, and May 15, respectively. Rates of production increase with time were calculated from the first derivative of the equation $\mathbf{Y=ab^X}$ fitted for each year's data, where **Y** was production and **X** was days after March 31. Coefficients are given in Table 1. Homogeneity of transformed regression coefficients (log b) was tested using analysis of covariance. Yearly differences among regression coefficients for both crested wheatgrass and big bluegrass were significant ($P<.05$). Factors explaining differences in growth rates among years are not known. However, pooling the data across years produced nearly identical log a and log b coefficients for crested wheatgrass and big bluegrass.

In 1969 yield production of big bluegrass on May 16 (Fig. 1) was 163% greater than that of crested wheatgrass. That year followed the severe 1968 drought. While available soil N was not monitored in this study, it is suggested that: (1) available soil N in 1969 was increased through residual N carry-over from 1968, and (2) big bluegrass responded more rapidly to that N supply than did crested wheatgrass in 1969.

Other studies on the Squaw Butte Range Station (Hyder and Sneva 1963; Sneva and Hyder 1965) have shown that big bluegrass produced as much as, or more yield than, crested wheatgrass in most years. This was confirmed from yields taken in 1973 (596 vs 717 lb/acre) and 1974 (787 vs 939 lb/acre) for mature crested wheatgrass and big bluegrass, respectively. Since production was nearly equal on May 15, big bluegrass had attained a lower percentage of its potential growth than had crested wheatgrass by that date.

More research is needed to study factors which determine growth rates of these two species in early spring. Of special interest is the potential for manipulating growth curves using fertilizer.

Results suggest that, in this locale, early spring productivity of Sherman big bluegrass is not greater than that of Nordan crested wheatgrass. Assuming that the herbage of both grasses is equally available to the grazing animal and both are equally tolerant to grazing at this time, the date of "grazing readiness" for the two grasses should be the same. The fact that Sherman big bluegrass has a more erect growth and is more advanced phenologically than crested wheatgrass has been the primary reason for suggesting an earlier date of "grazing readiness."

Literature Cited

Currie, Pat O. 1969. Plant response and cattle gains on Sherman big bluegrass. J. Range Manage. 22:258-261.

Hanson, A. A. 1959. Grass varieties in the United States. U.S. Dep. Agr., Agr. Handbook 170. 102 p.

Hyder, D. N., and F. A. Sneva. 1963. Studies of six grasses on sagebrush-bunchgrass range. Oregon Agr. Exp. Sta. Tech. Bull. 71. 20 p.

Sneva, F. A., and D. N. Hyder. 1965. Yield, yield-trend, and response to nitrogen of introduced grasses on the Oregon High Desert. Oregon Agr. Exp. Sta. Spec. Rep. 195. 18 p.

Vallentine, J. F. 1971. Range development and improvements. Brigham Young University Press, Provo, Utah. p. 498-507.