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Cool Season Grass Variety Comparisons in Harding County

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COOL SEASON GRASS VARIETY COMPARISONS IN HARDING COUNTY

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Summary

Yields of an improved variety of native western wheatgrass (Mandan 456) ranked highest of six pasture grasses in three out of six years of clipping studies. Yields of two selections of native green needlegrass (Lodorm and SD-93) ranked very near those of western wheatgrass. Average longevity[1/] was also highest for western wheatgrass.

Yields of Oahe intermediate wheatgrass ranked highest in five of six years compared to five other hay-type grasses. Average longevities of Oahe and Mandan 759 and Luna pubescent wheatgrass were about equal.

Annual yields of introduced grass varieties tended to fluctuate more widely than yields of either selections of native grasses or total native range forage.

Objectives

The purpose of the plant nursery trial in northwestern South Dakota was to (1) provide information for landowners on planting a special use pasture for grazing or hay production; (2) assimilate long term comparative yield and longevity data to support seeding recommendations; and (3) provide a visual comparison of sufficient size plantings for area residents, agency technicians, and others to observe growth and survival characteristics of various grasses.

Description of Nursery Location

The nursery was located at the Antelope Range Field Station approximately 15 miles southeast of Buffalo, South Dakota. Soils at the station are sedimentary, most having developed from sandy shales of the Hell Creek formation. Soils in the nursery varied from heavy clay to clay loam with a restrictive claypan at varying depths below the surface.

Total annual, growing season, and vegetation year precipitation for Redig, South Dakota, are shown in Table 1. Redig, approximately 21 miles southwest of Antelope Range, is the nearest U. S. Weather Bureau reporting station with a long term record. Average annual precipitation at Redig was

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[1/] Average longevity is an average of the estimates of the percentage of the seeded variety remaining in the stand in 1977, 1978, and 1979.

12.8 inches through 1973; thereafter, the average was corrected to 14.1 inches.

Procedures

A Nisbet[2/] drill with double disc furrow openers and depth bands was used to plant the seed in 7-inch row spacings. Each variety was randomly assigned to a ¼ acre plot without replication. Twelve cool season grasses were planted in early April 1971, and six warm season grasses were planted in early June. Warm season grasses seeded were big bluestem (NDG-4), little bluestem (ND-384), sideoats grama (Pierre), and switchgrasses (Summer, Pathfinder, and NDG-965-98). Warm season grasses were not successfully established and were replanted June 1, 1973. The entire nursery was fenced to prevent grazing by domestic livestock.

Samples were harvested in late June or early July with a Jari[2/] mower. Two yield samples, each 3 x 30 ft., were mowed and weighed in the field. Sub-samples, collected from whole samples were also weighed, then oven dried to determine moisture content of the whole samples. Yields represent only weight of the seeded variety; other vegetation was separated and removed. At the end of each growing season all plots were mowed or grazed as uniformly as possible to remove old growth.

Grasses were fertilized with 40 lb/acre actual nitrogen (ammonium nitrate) in April 1973, and 60 lb/acre N (urea) in April 1978.

Unfertilized native forage yields on a winter grazed thin Claypan range site near the plant nursery were sampled annually from 1975 through 1978. Native forage yields were estimated for 1973 and 1979. These data were used to compare with yields of the seeded pasture-type grasses.

Results and Discussion

Good soil moisture conditions at the time of planting resulted in the establishment of good to excellent stands of most cool season varieties. None of the warm season grasses developed successful stands. Western wheatgrass (Mandan 456) was the slowest cool season grass to become established, probably because that plot was situated on the poorest soil in the nursery.

Pasture-Type Grasses

Annual yields of improved pasture-type grasses are shown in Table 2. Also, shown are annual yields of native vegetation sampled near the plant nursery.

In general, yields of all the pasture grasses sharply decreased from 1973 through 1979. Yields of the three selections of native grasses (green

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[2/] Mention of trade names does not constitute endorsement by the authors or South Dakota State University.

needlegrass and western wheatgrass) were generally greater than the three introduced grass varieties.

Response to added nitrogen and above normal precipitation was quite evident in 1973 and 1978. There was probably some carryover effect of the added nitrogen in 1975 and 1979. Russian wildrye did not respond to nitrogen fertilization and was clearly not adapted to the site. Unfertilized native forage yields equalled or exceeded yields of the improved grass varieties in three of the six years.

Yields of Mandan 456 western wheatgrass were either highest or above the average yield of all six pasture grasses in four of the six years. Western wheatgrass also had the highest average longevity in the last three years (92%). Average longevity of the other grasses was: crested wheatgrasses (90%), Russian wildrye (75%), and green needlegrasses (68%).

Hay-Type Grasses

Yields of hay-type grasses followed the same pattern as yields of pasture grasses (Table 2). All varieties responded to added nitrogen in 1973 and 1978, but Oahe intermediate wheatgrass exhibited the greatest response. The intermediate wheatgrasses (Oahe, Luna and Mandan 759) were the best producers in most years. These three varieties also ranked highest in the percentage of the seeded species remaining in 1977, 1978, and 1979 (83 to 89%) compared with less than 69% of the stand remaining for the other three hay-type grasses. However, creeping foxtail is better suited for wetter sites and not well adapted to dry uplands. Little is known of the adaptability of meadow bromegrass in South Dakota although it has been reported to be adaptable on dry uplands in Idaho where annual precipitation is greater than 15 inches.

Conclusions

New seedings should be deferred from grazing during the first two growing seasons to aid stand establishment. Different soil types have differing fertilizer requirements, so soil nutrient tests should be obtained before applying fertilizer. In general, the soils at the Antelope Range nursery appear to require at least 40 pounds of nitrogen annually for maximum yield of improved varieties of cool season grasses. Less nitrogen is required in dry years.

Based on their response to annual mowing, the grasses reported in this trial appear to require intensive management such as fertilization and weed control in order to prolong their life span. The pasture grasses would very likely respond differently to grazing than they did to mowing once each year.

Cost input for land preparation, seeding, deferment, fertilization, weed control and intensive grazing management must be considered before implementing a special use planting. Such plantings should be separately fenced to facilitate the intensive management required. Since the investment required for establishing and maintaining a dryland special use

pasture or hay land planting is quite large, these types of plantings should be made on sites having high, rather than low, productive potential. Improved selections of cool season grasses can be an important addition to a ranch. Grazing a special use pasture in spring and early summer can provide a valuable period of deferment for native range. Fall grazing of some grasses may also be possible.

Additional information on improved grasses for specific purposes may be found in South Dakota State University Agricultural Experiment Station Bulletin 642, and SDSU Cooperative Extension Service Fact Sheets 546, 547, 548 and 549.

Table 1. Total annual, growing season and vegetation year precipitation and departures from normal at Redig, South Dakota, 1970-1979.

	Total Annual		Growing Season[1/]		Vegetation Year[2/]	
		Departure		Departure		Departure
1970	14.27	(1.50)	11.04	(1.05)	---	---
1971	20.19	(7.42)	14.06	(4.07)	15.84	(3.07)
1972	14.84	(2.07)	11.34	(1.35)	19.35	(6.58)
1973	15.18	(2.41)	11.36	(1.37)	13.16	(0.39)
1974	11.90	(-2.16)	9.90	(-1.48)	13.15	(0.39)
1975	17.65	(3.59)	13.60	(2.22)	17.12	(3.06)
1976	18.11	(4.05)	16.57	(5.19)	18.84	(4.78)
1977	24.08	(10.02)	15.27	(3.89)	17.68	(3.62)
1978	E20.30	(6.24)	17.17	(5.79)	25.38	(11.32)
1979	13.41	(-0.65)	11.13	(-0.25)	15.04	(0.98)

E = estimated

[1/] Growing Season = April through September

[2/] Vegetation Year = previous September through August of current growing season

Table 2. Annual yield (lb/acre to nearest 25 lb) and rank (%) of 12 cool season grasses seeded in April 1971 at the Antelope Range Field Station, Harding County, South Dakota, 1973-79.

	1973	1975	1976	1977	1978	1979
	Yield/Rank[1/]	Yield/Rank	Yield/Rank	Yield/Rank	Yield/Rank	Yield/Rank
COOL SEASON PASTURE-TYPE GRASSES:						
Crested wheatgrass (Fairway)	2350/ 72	1500/ 62	600/ 51	425/ 85	3300/ 90	1025/ 82
Crested wheatgrass (Nordan)	2350/ 72	1775/ 73	700/ 60	500/100	3275/ 90	900/ 72
Russian wildrye (Vinall)	1625/ 50	----/---	200/ 17	200/ 40	850/ 23	125/ 10
Western wheatgrass (Mandan 456)	2050/ 63	2425/100	825/ 70	300/ 60	3650/100	1250/100
Green needlegrass (Lodorm)	3250/100	2325/ 96	1175/100	350/ 70	3525/ 97	725/ 58
Green needlegrass (SD-93)	2850/ 88	2325/ 96	1025/ 87	325/ 65	2925/ 80	800/ 64
Average Annual Yield:	2412	2070	754	350	2921	804
Average Native Forage Yield[2/]:	1100	1500	1150	675	1460	900
COOL SEASON HAY-TYPE GRASSES:						
Intermediate wheatgrass (Oahe)	3700/100	2375/ 92	1000/100	600/100	3800/100	1075/100
Pubescent wheatgrass (Luna)	2300/ 62	2225/ 86	800/ 80	250/ 42	2875/ 76	825/ 77
Pubescent wheatgrass (Mandan 759)	2675/ 72	1375/ 53	700/ 70	325/ 54	3075/ 81	775/ 72
Meadow bromegrass (Regar)	2275/ 61	1505/ 59	400/ 40	50/ 8	3125/ 82	575/ 53
Creeping foxtail (Garrison)	1975/ 53	1275/ 50	250/ 25	100/ 17	2700/ 71	325/ 30
Basin wildrye (WY-813)	----/---	2575/100	525/ 52	475/ 79	1550/ 41	125/ 12
Average Annual Yield:	2585	1888	612	300	2854	617

[1/] Rank = percentage of highest annual yield in each group.

[2/] Native forage sampled on Thin Claypen range site 1975-78; yields were estimated in 1973 and 1979.