Stand Age Effects in Grasses?

by Dwain Meyer, North Dakota State University

Perennial grasses are known to be quite long lived. Grass was the native vegetation in the Great Plains for eons prior to settlers plowing out native grasses to seed primarily annual cereal crops. One bromegrass field at NDSU-Fargo was established prior to 1929 and it is still producing grass in 2005. A segment of this field has been used for a nitrogen fertilization experiment since 1956. Therefore, we have recorded yields for 48 years.

Table 1 shows two-cut forage yield over the past 10 years of the experiment as influenced by nitrogen fertilization. Obviously, nitrogen fertilization of this old stand has increased productivity and would be very economical even at 31¢/pound of N for today's cost. Yields have been very similar the last 10 years to the first 10 years, but has the productivity of the grass been sacrificed by keeping this old stand? Rainfall has averaged nearly 5" above the long term average the past 10 years. Is the higher production due to rainfall patterns only?

Dr. John Berdahl at USDA-ARS Northern Great Plains Research Center at Mandan, ND, evaluated stand age effects in intermediate wheatgrass, commonly used in the wildlife mixture for CRP seedings (Table 2). Forage yield was similar in the first year of production with or without N fertilization. Yield in the following years was 25.3, 73.5, 108.1 and 85.6% higher in the fertilized compared with the unfertilized treatment in the second, third, fourth, and fifth years, respectively. However, forage yield decreased from 5.3 to 1.7 tons/acre from the first to fifth year of production even when fertilized.

Annual rainfall differences have not been removed from these data so some yield loss might be due to differences in rainfall. These data suggest perennial grasses decrease in productivity with stand age very similar to alfalfa. Alfalfa stands generally are discontinued after 3, 4, or 5 years of production due to declining yields, weed invasion and taking advantage of the potential N credits to a subsequent grass crop. How many perennial grass stands are discontinued after 4 or 5 years due to declining productivity?

An experiment was initiated three years ago to evaluate stand age effects in perennial grasses when annual rainfall differences are removed. Four species, bromegrass, intermediate wheatgrass, switchgrass, and timothy, have been/will be seeded each year for 5 years so that there will be a 1-, 2-, 3-, 4-, and 5-year-old stand within a single year. In addition, there are four fertility treatments, 0, 67, and 134 lb N/acre plus a grass-alfalfa mixture, within each species. It will be interesting to see if there are truly stand age effects in perennial grasses when annual rainfall differences are removed.

Fertilization rate	Forage yield (tons/acre)	Fertilization rate	1994	1995	1996	1997	1998
0	1.82	lb N/acre	tons/acre				
33	2.27	0	5.10	4.38	2.23	1.11	0.90
66	3.15	45	5.30	5.49	3.87	2.31	1.67
133	3.74						
200	4.18	Table 2. Forage yi	eld of inter	mediate w	heatgrass 1	with age o	f stand (1
266	4.55	cut).					

Table 1. Yield (1995-2004) of old bromegrass fertilized annually at Fargo, ND, since 1956.