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Nitrogen, Phosphorus, and Potassium Fertilization for Newly Established Tall Fescue

D. W. Sweeney
Kansas, dsweeney@ksu.edu

J. L. Moyer
Kansas State University, jmoyer@ksu.edu

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Abstract

First-year spring yields of tall fescue in 2013 responded to phosphorus (P) fertilization, but lodging at the R5 growth stage in the spring with higher P fertilization rates may have influenced subsequent fall harvest yields, which declined with increasing P rates. As N rates increased, R5 yields declined but fall harvest yields increased.

Keywords

tall fescue, cool-season grass, fertilizer

Nitrogen, Phosphorus, and Potassium Fertilization for Newly Established Tall Fescue

D.W. Sweeney and J.L. Moyer

Summary

First-year spring yields of tall fescue in 2013 responded to phosphorus (P) fertilization, but lodging at the R5 growth stage in the spring with higher P fertilization rates may have influenced subsequent fall harvest yields, which declined with increasing P rates. As N rates increased, R5 yields declined but fall harvest yields increased.

Introduction

Tall fescue is the major cool-season grass in southeastern Kansas. Perennial grass crops, as with annual row crops, rely on proper fertilization for optimum production. Meadows and pastures are often under-fertilized and produce low quantities of low-quality forage. This is often true even when new stands are established. The objective of this study was to determine whether nitrogen (N), P, and potassium (K) fertilization improves yields during the early years of the stand. Potassium fertilization had no effect on fescue yield measured at the spring E2 and R5 growth stages or in the fall.

Experimental Procedures

The experiment was established on a Parsons silt loam at the Parsons unit of the Kansas State University Southeast Agricultural Research Center in the fall of 2012. Initial soil test values averaged 6.9 pH, 2.8% organic matter, 4.2 ppm P, 70 ppm K, 3.9 ppm NH_4-N, and 37.9 ppm NO_3-N in the top 6 in. The experimental design was a split-plot arrangement of a randomized complete block. The six whole plots were combinations of P_2O_5 and K_2O fertilizer levels allowing for two separate analyses where (1) four levels of P_2O_5 consisting of 0, 25, 50, and 100 lb/a and (2) a 2 × 2 factorial combination of two levels of P_2O_5 (0, 50 lb/a) and two levels of K_2O (0, 40 lb/a). Subplots were four levels of N fertilization consisting of 0, 50, 100, and 150 lb/a. P and K fertilizers were broadcast applied in the fall as 0-46-0 (N-P-K; triple superphosphate) and 0-0-60 (potassium chloride). Nitrogen was broadcast-applied in late winter as 46-0-0 (urea) solid. Early growth yield was taken at E2 (jointing) growth stage on May 1, 2013. Spring yield was measured at R5 (post-bloom) on June 7, 2013. Fall harvest was taken on September 10, 2013.

Results and Discussion

In 2013, fescue yield at E2 increased with P rates up to 100 lb/a P_2O_5 (Table 1). By R5, P fertilization increased yield above that with no P, but there were no differences be-

tween P rates. At fall harvest, yield declined with increasing P rate. This may be a result of plant damage from the extensive lodging at the spring R5 harvest. Nitrogen fertilization rate did not affect early E2 fescue yield; however, N effect on fescue yield at R5 and in the fall appeared to be opposite that seen for P fertilization. At R5, yield tended to decline with increasing N rate, but in the fall yield increased with increasing N rate. Potassium fertilization had no effect on fescue yield measured at the spring E2 and R5 growth stages or in the fall.

Table 1. Tall fescue yield in the spring and fall 2013 and R5 lodging visual estimates as affected by P_2O_5 and N fertilization rates

	Yield			
	Spring			
P_2O_5	E2 (jointing)	R5 (post-bloom)	Fall harvest	R5 lodging
---- lb/a ----	---------- ton/a ----------			- % -
0	0.26	3.41	2.05	1
25	0.64	4.32	1.99	53
50	0.88	4.51	1.74	97
100	1.50	4.47	1.48	100
LSD (0.05)	0.28	0.63	0.29	19
Nitrogen				
---- lb/a ----				
0	0.76	4.48	1.61	58
50	0.84	4.16	1.70	61
100	0.83	4.17	1.91	67
150	0.84	3.89	2.04	65
LSD (0.05)	NS[1]	0.33	0.15	NS

[1] Not significant.