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Influence of Simulated Golf Cart Traffic and Nitrogen Rate on Buffalograss Quality

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Summary. Application of 2 and 3 lb N/1,000 ft² resulted in acceptable buffalograss quality when subjected to simulated golf cart traffic. Across all fertilizer treatments, traffic rates of 8 and 16 passes per week resulted in unacceptable quality ratings for the study duration.

Rationale. Buffalograss [*Buchloe dactyloides* (Nutt.) Engelm.] is a low-maintenance turfgrass species that requires minimal irrigation to maintain an acceptable quality. Due to the increasing concern for water conservation in Kansas, turfgrass researchers are exploring the use of buffalograss on golf courses. One of the most common stresses to golf course turfgrass is injury from golf cart traffic. Limited research has been conducted on buffalograss fertility management when subjected to wear of golf carts.

Objectives. Determine the influence of nitrogen fertilizer rate on buffalograss quality when subjected to simulated golf cart traffic.

Study Description. A field study was initiated in July 2014 at the Rocky Ford Turfgrass Research Center in Manhattan, Kansas. This study was conducted using a strip-plot design with a 4 × 5 factorial treatment structure. Treatments consisted of two main factors: nitrogen fertilizer rate and golf cart traffic. Fertilizer treatments consisted of 0, 1, 2, or 3 lb N/1,000 ft² of a 46-0-0 (N-P-K) urea product applied in two half-rate applications at 1 and 8 weeks after initiation. Simulated golf cart traffic treatments were applied twice per week, totaling 0, 2, 4, 8, and 16 passes per week. Traffic treatments were applied with a custom-built traffic simulator (Figure 1). Buffalograss quality (1 to 9 scale in which 1 = poor quality; 6 = acceptable quality; 9 = best quality) was assessed biweekly throughout the duration of the research trial.

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Data were subjected to analysis of variance using the Proc Glimmix procedure in SAS (SAS Institute Inc., Cary, North Carolina). Fisher's protected LSD was used to determine differences when $P \leq 0.05$.

Results. Significant main effects of fertilizer rate and traffic were observed. Fertilizer rate by traffic interaction was not significant. Applications rates of 2 and 3 lb N/1,000ft² resulted in acceptable buffalograss quality throughout the duration of the trial (Table 1). Golf cart traffic rates of 8 and 16 passes per week did not result in acceptable quality throughout the study (Table 2). Traffic rates of 0 and 2 passes per week had the overall highest quality ratings of all traffic treatments across all fertilizer treatments (Table 2).

Table 1. Main effect of fertilizer rate on buffalograss quality[†] when subjected to simulated golf cart traffic.

Fertilizer rate	Buffalograss quality							
	0	2	4	6	8	10	12	14
	WAT [‡]	WAT	WAT	WAT	WAT	WAT	WAT	WAT
3lb/1000sqft	5.73	6.20a [§]	6.13a	6.40a	6.80a	6.80a	6.27a	6.27a
2lb/1000sqft	5.60	6.20a	6.00a	6.27a	6.67a	6.47a	5.73b	5.67b
1lb/1000sqft	5.73	5.80b	5.60b	5.80b	5.93b	6.07b	5.20c	4.87c
0lb/1000sqft	5.40	5.33c	5.40b	5.53b	5.33c	5.47c	4.47d	3.93d

[†] Buffalograss quality was rated per the National Turfgrass Evaluation Guidelines for quality on a 1 to 9 scale in which 1 = poor quality, 6 = acceptable quality, and 9 = best quality. Quality ratings were taken visually every other week.

[‡] Indicates weeks after treatment.

[§] Means in a column followed by the same letter are not significantly different according to Fisher's protected LSD test, ($P \leq 0.05$).

Table 2. Main effect of golf cart traffic on buffalograss quality[†] pooled across all fertilizer rates.

Traffic rate (pass/week)	Buffalograss quality							
	0	2	4	6	8	10	12	14
	WAI [‡]	WAI	WAI	WAI	WAI	WAI	WAI	WAI
0	5.58	5.92a [§]	6.17a	6.42a	6.83a	7.33a	6.83a	6.67a
2	5.83	6.00a	6.17a	6.33ab	6.83a	6.58b	6.00b	6.00b
4	5.58	6.08a	5.75b	6.00bc	5.92b	6.17b	5.25c	4.92c
8	5.50	5.83ab	5.58bc	5.67cd	5.83bc	5.50c	4.67d	4.67c
16	5.58	5.58b	5.25c	5.58d	5.50c	5.42c	4.33d	3.67d

[†] Buffalograss quality was rated as per the National Turfgrass Evaluation Guidelines for quality on a 1 to 9 scale in which 1 = poor quality, 6 = acceptable quality, and 9 = best quality. Quality ratings were taken visually every other week.

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Figure 1. The golf cart traffic simulator used in this study consisted of two independent trailers with a solid axle. Simulator obtained equivalent lbs/in² tire weight of average golf cart with two golfers and clubs.

